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TRAUMATIC ASPHYXIA.

REPORT OF A RECENT CASE, WITH A STUDY OF THE MINUTE PATHOLOGY, AND SUMMARY OF REPORTED CASES.

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THE writers desire to report the following case, not only because of its great rarity, but because it is the only case in which microscopic study of sections of skin taken from the living has been made, and by this study all doubt as to the minute pathology and cause of the discoloration cleared away. The mechanism of the remarkable condition is expressed by the term traumatic asphyxia or apnœa; the striking discoloration follows forcible compression of the thorax so that breathing cannot take place for several minutes. The number of cases that have recovered, cases which have been studied in life, is very small. It has been possible to find in all literature but

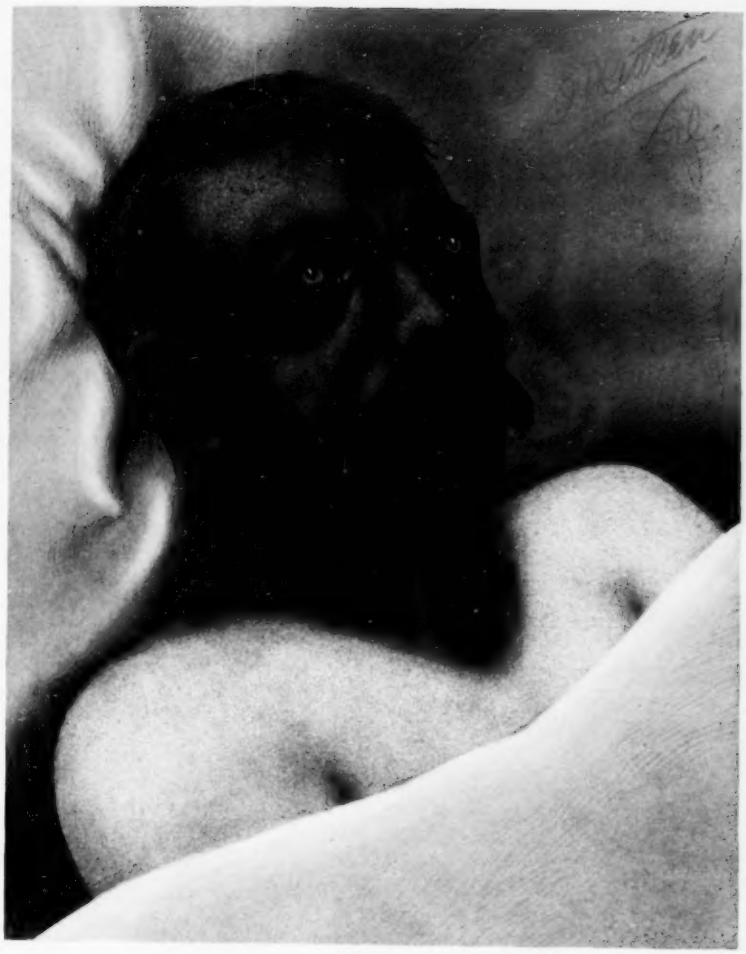
six cases,—one case reported by Burrell and Crandon, of Boston, the other five reported by German observers.

The report of the writers' case is as follows:

The patient entered the West Surgical Service of the Massachusetts General Hospital on January 2, 1902. He was a large, muscular German, thirty years old, by occupation a grocer, and was said to have been in perfect physical health up to the time of the accident. About an hour before, he had been caught and held by a moving freight elevator. The elevator was stopped and the man released in from three to five minutes. It was related by observers that while being released his face became black and blood ran from his nose and mouth, and that his eyes protruded. He was unconscious for a few minutes after being released.

Examination in the accident room in the hospital, approximately one hour after he was injured, was as follows: Especially well-developed and nourished; perfectly conscious, but dull and sluggish; in a state of moderate shock; temperature 99.5° F. It was apparent from physical signs that he had been subjected to violent trauma from the groins and buttocks to the midthoracic region; over the skin of the abdomen were several contusions; in the left loin and back, low down towards the pelvis, was a large fluctuating hæmatoma; the eighth and ninth ribs on the left side were fractured in the midaxillary line; in the neighborhood of the fractured ribs, for a short distance, was a moderate amount of subcutaneous emphysema. Examination of the heart and lungs was negative. The appearance of the face and eyes was as is shown in the picture. (See chromolithograph.) Pressure on the blue-black skin did not cause it to pale completely as in cyanosis, but, on the contrary, had little effect.

On careful inspection the skin of the face seemed to be dotted with countless spots, from black and reddish-black to blue in color, very close together, while between the spots were lines or areas, very minute, of normal appearing skin. These spots were plainest at the line of the hair on the forehead and close to the normal skin on the neck. The artist has well shown the punctate nature of the coloring. The line of demarcation in the neck in front was sharp, the transverse line running through the inner ends of each clavicle; this can be seen in the picture. What is not shown in the picture, and has not been noted in any other case, is that the



double triangle of the trapezius muscle was marked out very clearly; that is to say, that at the back of the neck there was none of the bluish-black discoloration of the skin except within the confines of this muscle. The ophthalmoscopic examination of the retinæ showed no hæmorrhages. (In this connection, it is to be noted that Burrell's case showed retinal hæmorrhages; in Braun's case, however, there were none.) The conjunctivæ bulged forward prominently because of extensive hæmorrhages underneath. The pupils were equal and reacted to light. Urine examination showed nothing abnormal. The patient recovered. At no time was he very sick, except on the third day his temperature rose to 106° F., and he had labored breathing and slight bloody expectoration, and both lungs were full of râles; this condition, however, passed away in twenty-four hours. The hæmatoma in the back was aspirated six times; each time from one to two pints of bloody serum were withdrawn, but this re-accumulated with great rapidity, so that at last free incision and packing with gauze were necessary, after which the condition was relieved; the serum was at all times sterile.

On the second day after entrance, while the discoloration was still in its greatest intensity and had not visibly faded, with the consent of the patient, pieces of skin were removed from the discolored area in the neck for microscopic examination, with a view of throwing some light on the much disputed question of the etiology and minute pathology of this rare condition. So far as we can ascertain, this is the only case in which it has been possible to study sections of the skin obtained from a living patient, and, as will be discussed later in this article, it seems to the writers that the study in this case has definitely settled much of what was previously doubtful as to the pathology.

The discoloration disappeared rapidly after the third day, apparently simply fading out; the areas of normal skin between the punctate color spots became larger and wider; the general color scheme turned from black to lead color, to a slightly cloudy appearance of the skin, and three weeks afterwards the patient's face seemed almost normal, having only a slightly suffused appearance. In contrast to the fading away of the color in the face, the subconjunctival discoloration went through the usual chemotactic changes seen in the absorption of any blood-clot. In the face there were no pigmentary changes, in the eyes these were present. All

the functions of the body were performed normally during convalescence.

The gross cause of this unusual clinical picture is admitted to be forcible compression of the chest, extending over some minutes, accompanied by entire cessation of respiration. Knowledge of the pathology has hitherto been obtained from post-mortem findings in fatal cases. It has long been noted that this peculiar discoloration of the face was seen not infrequently in individuals pressed to death in struggling crowds or mobs. Ollivier, Tardieu, and others have reported post-mortem findings in such cases, but, aside from the appearance of the face and eyes, no specially characteristic pathological lesions were found. In all cases it was noted that the blood was black, fluid, and filled all the veins running into the heart; that punctate hæmorrhages occurred into the loose tissues of the scalp, on the surfaces of the pleuræ and pericardium, and the heart and abdominal viscera; that is to say, the usual findings in fatal cases of suffocation from whatever cause.

The minute cause of the discoloration has been the subject of greatest interest; this, as well as the reasons for its sharp limitations, has not been definitely determined. In view of the great rarity of the condition in the living, the writers desire to give a *résumé* of reported cases, together with the important conclusions in the light of their own case.

Summary of Cases.—Braun reports one case of his own and gives two other cases, one reported by Hueter, the other by Vogt. Willers, in an inaugural dissertation, discussed these last two cases. It will be remarked in the reports of certain of the following cases that the words hæmorrhages, petechiæ, ecchymoses, extravasations, and effusions are used by those reporting the cases to describe the general cause of the discoloration as well as its punctate appearance. This use of words is manifestly inaccurate in the light of the microscopic finding in the writers' case.

Case I.—Braun, H. (*Ueber ausgedehnte Blutextravasate am Kopfe, Halse, Nacken und linken Arm infolge von Compres-*

sion des Unterleibes.) *Deutsch. Zeit. f. Chir., 1899,* Band li, p. 599.

February 26, 1878. G. K., twenty years old, was crushed by falling masonry, his chest and abdomen being compressed for half an hour. His head and neck were not struck.

Physical Examination.—Face: no lesion of skin, which was of a dark blue color, especially on the left side. The bulbi appeared very prominent; in both conjunctivæ, corresponding to the aperture of the lids, there were marked bloody extravasations, and both pupils were dilated and did not react to light. There were a great many ecchymoses, from a pin-head to a pea in size, on the face, neck, and left upper forearm. Patient did not complain of pain in chest, but of great pain in abdomen; although there were no wounds of the skin or of the internal organs found, nor any symptoms which might point to such. He was conscious during the accident and on entrance to the hospital. Pulse and temperature normal. On the evening of the same day the ecchymoses of the skin were more marked than in the morning, and the pupils were still dilated, but reacted slowly to light. Urine was not passed during the day, but was drawn by catheter at night. It was clear, acid, no trace of blood, not even on microscopic examination, but there was present a marked trace of albumen.

The next day the swelling of the face had gone, but the small punctiform hæmorrhages were still marked. The pupils reacted normally. Examination of the retinæ showed no changes nor any extravasation of blood. Pulse and temperature normal.

Since the patient felt wholly well, and the swelling of the face had gone, and only ecchymoses of the skin and conjunctivæ were present, he was discharged on the fourth day. Seen again several months later. He was well.

(It is to be noted that this case had no severe symptoms; that the compression lasted half an hour; that he was discharged from the hospital while his face was still discolored.)

Case II.—Hueter. A boy, fourteen years old, was caught by the flail of a threshing-machine over the abdomen. He had a penetrating wound in the abdominal wall, from which the intestines protruded, and were put back by Hueter. The wound healed without event in four weeks. He was not unconscious at the time and there was no injury to the head. His face was dark blue in color and covered with petechiæ the size of a pin-head and slightly

larger, with irregular notched edges. This condition was found over the whole face, extending upward to the hair, while the lower boundary ended on a line with the thyroid cartilage. The conjunctivæ contained blood, and also the nasal mucous membrane. There was marked epistaxis. After twenty-four hours the face was no longer blue, but arterial hyperæmia was present, which lasted three days. After this these small blood extravasations ran a normal course, and on discharge only the remains of the subconjunctival hæmorrhage were present.

Case III.—Vogt. In 1871 Vogt was called to see a boy fifteen years old whom he found lying on a soft sandy road, the wheel of a heavily loaded wagon having passed over his abdomen. He was apparently unconscious and was taken to a house. A contusion of the abdominal wall was found, not very severe. The face was blue and contained small extravasations of blood under the skin, as if they were sown seed. The extent of this was the same as in the case of Hueter. There was no injury to the head. All discoloration was gone in three weeks.

Case IV.—Perthes, G. (*Ueber ausgedehnte Blutextravasate am Kopfe infolge von Compression des Thorax.*) *Deutsch. Zeit. f. Chir., 1898–99,* Band l, p. 436.

On July 15, 1898, a boy fourteen years old was working in a cotton mill as a spinner, when, according to eye-witnesses, he was struck by a machine-driven carriage. He was struck on the right side of the chest, and so pressed, with his left shoulder against a bench, that his thorax was crushed into a two hands'-breadth space, but his head remained free. The boy was rescued in an unconscious condition, but while in the factory regained consciousness. He himself said positively that during the first hour after the injury he heard all that happened around him, but could not see. He was unable to recognize his brother, who accompanied him to the hospital.

We found, an hour after the injury, a very small boy for his age, weak and poorly nourished, conscious. The pulse was regular, strong, and 86 per minute. The boy's face was of a blue color, only the lower half of the right cheek being somewhat paler. The dark color did not disappear on pressure, but through it were easily seen countless dark red petechiæ. Similar petechiæ were seen on the upper half of the left side of the neck, and the lids of both eyes were very deeply colored a bluish-red. There was a

slight degree of exophthalmos. The conjunctivæ were completely suffused with blood and the sclera of each eye colored blue-red. No trace of any wound of the head could be found. There was no bleeding from the nose and ears. No paralysis of the nerves of the face and the pupils reacted to light promptly. There was, however, marked swelling of the tissues of the head, which was greater in the temporal regions, and because of which the whole shape of the head seemed changed.

There was a fracture of the left clavicle at the junction of the middle and outer thirds with typical dislocation. Over the third and fourth ribs on the right side of the midaxillary line there were circumscribed tenderness on pressure and crepitation. Breathing was frequent and catchy, but examination of the lungs showed nothing abnormal, especially no hæmothorax. There was no hæmoptysis.

During the course of his illness, the only thing noteworthy was a slight rise in the temperature to 38.3° C. without any perceptible cause. From this time on the temperature remained at 37.3° C. The pulse-rate varied from 76 to 96. The absorption of the extravasated blood followed quickly. After four days the dark color of the skin had partly gone, only several petechiæ remaining visible about the eyes, which were still a dark bluish-red.

On discharge, on the 8th of August, the fractures had healed without deformity. The subcutaneous blood extravasations had been absorbed, but the ecchymoses under the subconjunctivæ remained six weeks after the injury.

(Not so extensive, but otherwise similar, with blue extravasations, is the second case reported by Perthes.)

Case V.—A teamster, thirty-six years old, was caught between a part of an overturned wagon and an iron post so that his thorax was compressed anteroposteriorly; his head was not struck, but his left arm was caught underneath the wagon. Immediately he could not get his breath, and felt as if his eyes were starting out of his head. He retained full consciousness, heard clearly words spoken around him, but could not see.

Examination showed a strong man, conscious, but much excited. The pulse was small and rapid, breath very shallow and quickened. He complained of pain in the lower posterior part of the thorax with each inspiration. The whole face had a swollen appearance, especially in the temporal regions, and was of a bluish-

red color. This was especially noticeable in the lower eyelids and thereabouts. The scleral portions of both eyes were colored red with blood, as were also the palpebral conjunctivæ. At the upper part of the neck were several small bluish-red spots. Neither in the head nor thorax could any wound be found, not even posteriorly, where the patient complained of pain. There was no hæmoptysis. In the left forearm there was a fracture of the radius in the middle, complicated with extensive crushing of the skin and muscles on the outside.

He was chloroformed, the radius was wired, and the wound drained. On the third day there was a rise in temperature to 38.9° C. Behind, on the left side of the thorax, where the patient had complained of pain, were found dulness and râles on auscultation. There was marked bloody sputum. A diagnosis was made of "contusion-pneumonia." The rise in temperature lasted but four days, and on the tenth day following the accident all pneumonic symptoms had gone. The bluish-red color of the face had wholly gone in four days, with the exception of that about the eyes. On the thirtieth day there were still a few traces of the subconjunctival hæmorrhages. There was no disturbance of vision.

Perthes discusses his cases as follows, his own use of words is retained: The two patients during the first two days appeared to be exactly similar. Their faces had a dark-blue coloring, which did not disappear on pressure, but on close observation one could see under this bluish-red coloring still deeper specks caused by the entrance of blood into the skin. These petechiæ were also seen to extend to the upper part of the neck. The coloring of the face was so striking that the second patient was addressed as "The Nigger" by his companions in the hospital. The color in both cases was due not only to ecchymoses, but also to hæmorrhages into the subcutaneous tissue. In both cases the eyelids and their immediate neighborhood were the seat of the most marked effusion. The peculiar appearance which both our patients had was mainly caused by the deep red color of the scleræ, due to hæmorrhage under the conjunctivæ, no white remaining. The patients said that they had immediately lost sight. Possibly this was caused

by a venous hyperæmia and œdema of the retina, or perhaps by compression of the optic nerve by retrobulbar effusion of blood. The intracutaneous effusion of blood in the face disappeared very quickly in both cases, on the fifth day only traces of it could be seen. The effusion in the lower lids lasted much longer, and the subconjunctival hæmorrhage lasted from five to six weeks.

CASE VI.—Burrell, H. L., and Crandon, L. G. R. (*Boston Medical and Surgical Journal, January 2, 1902,* p. 13.)

"E. F., twenty-two years old, single, was brought to the Boston City Hospital on December 7, 1900, having sustained a crushing injury to the chest. The detailed history is as follows: One hour before admission, the patient, in a standing position, had been caught between an electric car and the door-post at the entrance to the car-house. His chest had been compressed antero-posteriorly; the head and pelvis were not caught. He was held as in a vise fully three minutes before the car was moved, he then fell unconscious.

"Physical examination on the accident table showed a large, muscular man with especially well-developed thorax. He was entirely unconscious; pulse 100, weak but regular; respiration 30, shallow, with a groan at the beginning of each expiration. The hands and nose were cold. There was slight bleeding from both ears and both nostrils, and blood in the mouth; no wounds on the head; pupils small, equal, and did not react; excessive chemosis. Knee-jerks were absent, other reflexes present, but diminished.

"In the region of the left lower ribs anteriorly, about the seventh, eighth, and ninth, near the nipple line, was an undetermined fracture of one or more ribs, undetermined with exactness because of a considerable area of subcutaneous emphysema. This air under the skin extended over the whole left front chest and made palpation and auscultation of this area of little value. There was slight general abdominal spasm, but no unusual dulness, nor was there any vomiting.

"The striking feature of the case, however, was the condition of the man's skin. From the level of the third ribs, upward over the neck and face and into the scalp, the skin presented a

dusky, bluish, mottled appearance. This color became only slightly paler if pressed with the finger, and when the pressure was removed it slowly regained its former tint. At first it was thought that the patient was cyanotic, but, as the color was not universal over the body, and as it did not disappear on pressing the skin, and as it persisted even after the patient's general condition improved, it was evident that cyanosis was not the cause. Examined more closely it could be seen that uniformly distributed all over the dusky skin were minute (.5 to 1 millimetre) areas of natural skin-tint, each surrounded by a poorly defined bluish border, these borders uniting in a meshwork. This condition extended over the red edge of the lips and on the mucous membrane of the mouth to a slight degree. In the eyes there was a considerable subconjunctival hæmorrhage, homogeneously distributed over as much of the sclera as is exposed by the open lids and not extending to the parts covered by the lids. There were minute retinal hæmorrhages.

"The patient was in a condition of extreme shock, and stimulation to the extent of nitroglycerin $^1/_{25}$ gr., atropine $^1/_{60}$ gr., and strychnine $^1/_{15}$ gr., was given subcutaneously, with ice-cap to head and heaters to body. At the end of four hours consciousness returned, and there was considerable improvement in the character of the respiration and pulse. About the chest was applied a broken-rib corset, so laced as to limit respiratory movements near the injured part of the chest.

"The urine on the day of the injury was dark red, acid, specific gravity 1028, with a large trace of albumen and less blood, and in a few days was normal.

"After three days the patient was relatively comfortable; respirations were 30; pulse 80, good volume and tension; sensorium clear; vision slightly blurred. The dusky, livid appearance of the skin of the face and neck was unchanged. Five days later, eight after the accident, the blue color began to fade; the tint, however, remaining as at first and not going through the usual modifications of a cutaneous hæmorrhage. The subconjunctival clot persisted and had not gravitated, as is usual, to the inferior angle of the conjunctiva. Eleven days after the injury the unnatural color of the skin was practically gone and the eyes had begun to clear. After three weeks the patient got up, and in a few days was discharged practically well."

The dominant and diagnostic feature of these cases has been the blue-black discoloration of the skin, mainly confined to the face and neck above the clavicle; in one the discoloration extended into the forearm for some distance, and in the other it extended over the chest wall to the second or third ribs. The question of special interest is the cause of the discoloration and the reason for its limitation practically to the regions of the face and neck. Is the discoloration caused by hæmorrhages into the subcutaneous tissues, or by venous stasis? Although the writers feel that in the light of their own case there can be no doubt in regard to this, yet, for the sake of completeness and interest, they give briefly the experimental work and the conclusions of the men who reported cases previously.

The work and conclusions of Hueter are reported by Braun (*loc. cit.*). Hueter experimented on a rabbit. He made marked and continued abdominal pressure, or struck the abdomen a sharp blow. The vessels in the ear dilated and the surface of the brain protruded through a trephine hole, but there was no extravasation of blood. After section of the splanchni in frogs, he obtained dilatation of the vessels under the skin, but no extravasation. Hueter concludes that the discoloration is probably due to stasis of blood from mechanical causes,—1. The sudden upward pressure of blood dilates the vessels of the face; 2. Pressure on the sympathetic nerves of the abdomen and thorax leads to a paralysis of the vessel walls.

Willers concludes that it is not determined whether it is due to stasis or hæmorrhage, but he prefers the mechanical theory of Hueter; that the blood is found only in the face he thinks is due to the lack of valves in the facial veins. He also thinks that these cases are oftener seen in the young, who have more numerous skin capillaries than the old, in whom, besides being less in number, they are less elastic, and in whom such injury most often results in death.

(It is to be remarked that the ages of the cases, including the writers', are as follows: three cases were boys about fifteen years of age, all the others were young adults between twenty-two and thirty-six years old.)

As has been seen in his remarks above, Perthes is of the opinion that the cause of the discoloration is extravasation of blood, either minute or more extensive subcutaneous effusions, or hæmorrhages. He concludes that, following severe contusions with compression of the thorax, marked effusion of blood can occur in the head and its neighboring tissues without there having been any injury to the head itself. This is caused by the transmission of the increased intrathoracic pressure into the veins of the head and neck; its limitation to this area he explains by the absence of functionating valves, there being less competent valves in the jugular veins than in any others on the surface of the body. He states that there are no valves throughout the whole course of the internal jugular and innominate veins except a pair of valves at the entrance of the jugular into the innominate, and that it is well known that these valves are irregular and incapable of resisting the back pressure of an injection mass starting at the vena cava. The same is true of the external jugular. This vein possesses usually two inefficient pairs of valves, the first of which is the most constant and is placed where the vein enters the subclavian. The second pair is midway up the neck (Poirier: "Traité d'anatomie humaine"). These valves are no hinderance to the backward transmission of pressure into the veins of the head; and this also explains the limitation of the hæmorrhages to this region, since one can easily inject the veins of the head from the cava, but almost never those of the axillary supply, so we find ecchymoses and effusions of blood only where valves are absent or insufficient. As in these traumatic cases, the same series of events occur in a less marked degree in old people where ecchymoses or epistaxis follow severe coughing. So also in whooping-cough, a transient blindness or amblyopia has been seen.

Burrell and Crandon (*loc. cit.*) conclude that, while there may be true hæmorrhage into the skin, the facts that the color fades somewhat on pressure, and that the color does not go through the changes of tint usual in an absorbing hæmorrhage, favor the idea that the discoloration is due largely to a stasis of

FIG. 1.—Vertical section from the surface (low power), showing normal skin with pigment-bearing cells.

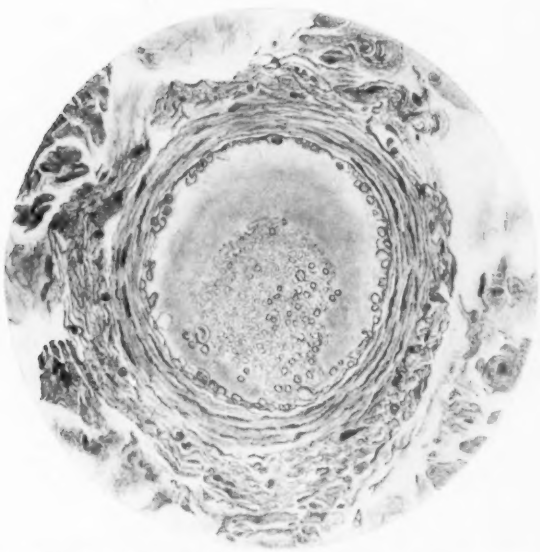


FIG. 2.—Section through small blood-vessel and neighborhood (high power). It is to be noted that no red blood-cells lie outside the lumen of the vessel.

carbonized blood in temporarily paralyzed and dilated capillaries.

The writers inclined from the first to the belief that there were no hæmorrhages of any size whatever into the skin, and that the discoloration was due to a stasis from mechanical overdistention of the veins and capillaries with or without paralysis from engorgement of or pressure on sympathetic nerves, but to determine this positively excised two pieces of skin from the neck under cocaine anæsthesia from an area as dark in color as any other. These pieces of skin were given to Dr. Wright, Pathologist to the Massachusetts General Hospital, and from them numerous microscopic sections were cut and examined. Every section studied showed normal skin; there were no signs of blood in the tissues outside of the blood-vessels. The accompanying cuts (Figs. 1 and 2) have been made from drawings of two sections.

It seems to the writers that this microscopic study proves definitely that the theories, that the discoloration is due, to any extent, to hæmorrhages, are wrong.

As to the cause of the sharp limitation of the color to the head and neck, the writers have nothing new to offer, but are inclined to consider rational the theory of Perthes, which ascribes it to the lack of valves in the jugular and facial veins, as outlined above.

The practical conclusions to be drawn from these cases are few in number and should be sufficiently obvious. It is idle to speculate on how many of the fatal cases might have recovered, as the above-mentioned cases did, could artificial respiration have been begun immediately after the release of the individual from the compression. From the very nature of the injury and its attending circumstances, surgical aid can rarely be on the spot except as a coincidence. It is rational to suppose, however, that the immediate use of artificial respiration and oxygen might resuscitate certain of such cases could it be applied at once; the cases that live without such aid will always be extraordinarily rare.

The secondary treatment, aside from combating shock,

must be symptomatic. On the second or third day in certain cases pulmonary complications, with pyrexia, bloody expectoration, and labored breathing, may appear; this condition Perthes called a "contusion-pneumonia;" it may be expected to subside rapidly and not to result fatally.

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OPERATION IN SPINAL-CORD INJURIES.

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In lesions concealed from the surface involving a central nerve organization of extreme delicacy, the extent and precise nature of which are unknown without exploration, the after effects of such far-reaching importance, the parts reasonably accessible, and the possibilities so great of benefiting the patient, the operative stand-point in injuries to the spinal cord is found to be of special interest.

This paper is based upon two cases of spinal-cord injury which Dr. Samuel J. Mixter permits me to report. Both cases were admitted upon Dr. Mixter's service at the Massachusetts General Hospital, Case I coming under my care while Surgical House Officer.

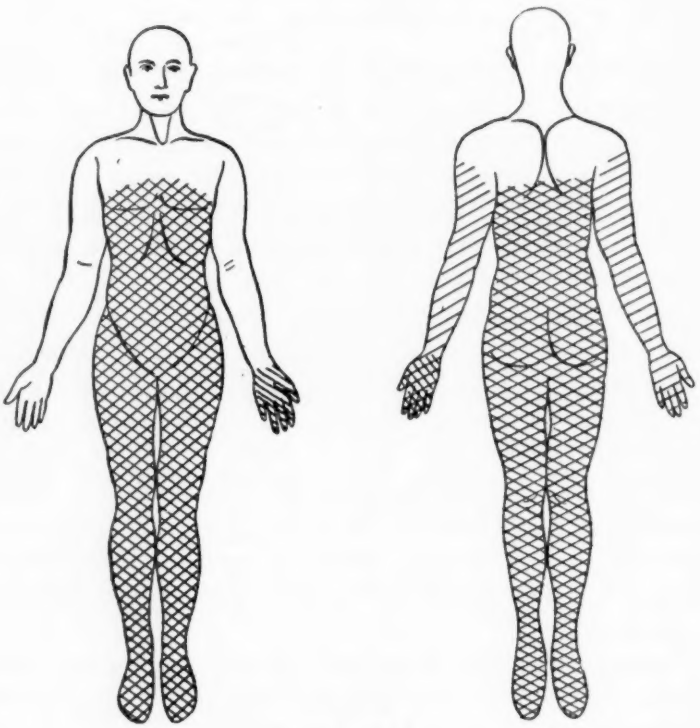
In literature there are numerous valuable articles on injuries of the spinal cord by Thomas,[1] Courtney,[2] Thorburn,[3] Walton,[4] Kocher,[5] Bastian,[6] Lloyd,[7] Löwenthal,[8] Taylor,[9] and others. Of recent papers that of Walton emphasizes the value of operation.

Case I demands interest and attention for the following reasons: 1st, Because there is high fracture of the spine, viz., in the cervical region; 2d, It was operated upon within twenty-four hours; 3d, Unusual length of life following the operation; 4th, Marked improvement in motion and sensation; 5th, Following death there was preserved a complete series of sections of the cord from the pons to the coccyx, making it possible to reproduce sections at different levels showing degeneration, which I have been unable to find in previous literature; 6th, Its bearing upon the question of early operation, and the fact that

if clinical observation suggests total injury of the cord, an operation of little danger in itself, may relieve the pressure and allow the continuation of normal function of uninjured fibres, which would otherwise succumb to pressure and degeneration.

CASE I.—On the morning of June 24, 1902, a man forty years of age was brought to the accident room of the Massachusetts

FIG. 1. FIG. 2.



Front. Back.

//// = Absence of motion. \\\\ = Absence of tactile sense.

General Hospital with the history of having fallen eight feet from a tree, striking on the back of his neck. The injury occurred at 7.30 P.M. the previous evening. It was said that he did not lose consciousness.

Upon admission to the hospital he was conscious; pupils reacted to light and with accommodation; he was unable to move

his head. Hearing and sight were normal; throat examination was negative. He complained of headache and pain in the neck. There were no external wounds. There was diaphragmatic breathing, complete loss of tactile sensation, flaccid paralysis below level of fourth rib in front, and below a line from the fourth to the seventh rib in the axillary line (Figs. 1 and 2), loss of reflexes. No broken bones were palpable, and no deformity of spine detected. Motions of shoulders slow; arms could be drawn up to chest slowly, but not extended. Unable to put either hand on the opposite shoulder. Type of sixth cervical nerve irritation.

Seen in consultation with Drs. Walton, Baldwin, and Paul, who considered the lesion to be in the region of the fifth and sixth cervical vertebræ.

Operation by Dr. Samuel J. Mixter; Dr. H. M. Chase assisting.

Patient on abdomen, head flexed over the end of the table; incision in median line of neck, spinous processes exposed and laminæ and spines of fourth, fifth, and sixth cervical vertebræ found fractured, depressed, and apparently lying against the cord. These were removed, exposing the dura, which looked normal. The dura was opened and cerebrospinal fluid escaped, no blood-clot under dura, small clot found under laminæ. Dura not sutured, wick inserted, superficial sutures, and bandage. Good recovery from ether. Temperature gradually rose to 104.6° F.; pulse slow and good volume.

June 25, 1902. No change in tactile sensation, arms are moved a little more deliberately.

June 26, 1902. Tactile sensation returning slightly.

June 30, 1902. Tactile sensation recovered over whole body except left hand (Figs. 3 and 4). Can locate accurately where one touches him, though sensation is not normal, as shown by the time required to locate the point of contact. Plantar reflexes, knee-jerks, and ankle clonus absent. Slight thoracic breathing. "Soreness" of muscles of arms. Paralysis still complete below dotted line, and of extensors of arms.

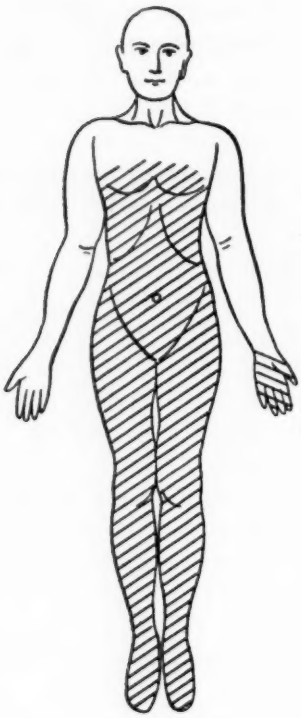
July 6, 1902. Slight plantar reflex and knee-jerk. No cremasteric reflex. Improvement in motion of left arm.

July 15, 1902. Ankle clonus present, tactile sensation normal except in left hand.

July 26, 1902. Hamstring muscles can be contracted, but not

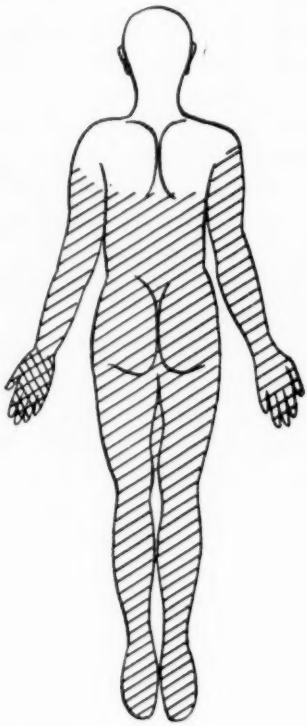
strong enough to raise the leg. Right foot can raise the great toe and next two toes. Left foot can move the great toe occasionally. Active knee-jerks.

FIG. 3.



Front.

FIG. 4.



Back.

//// = Absence of motion.

August 4, 1902. Can feebly flex and extend both forearms, slightly flex the fingers of right hand, occasionally raise both knees, and move toes of right foot.

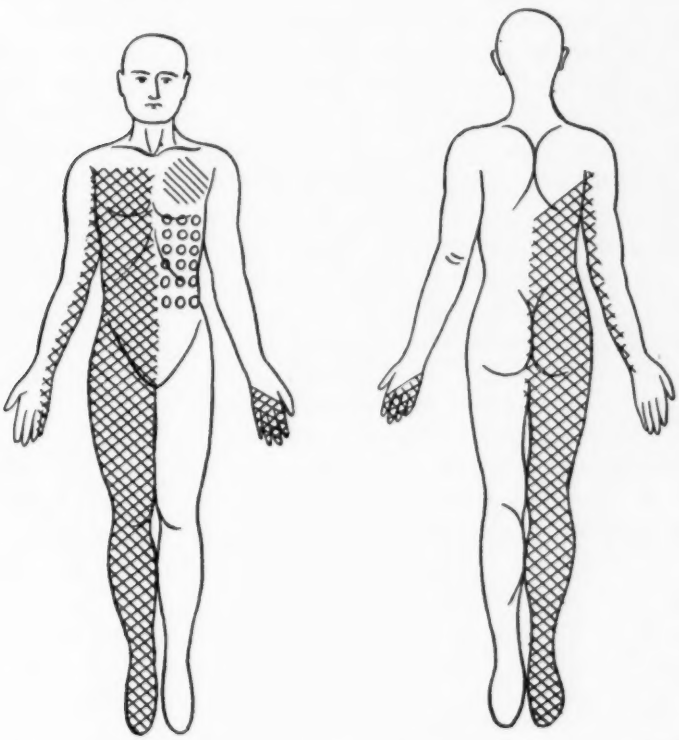
August 22, 1902. Tactile sensation preserved throughout, except ulnar side of left hand, front and back. No motion in left leg. Right thigh and toes move voluntarily. Areas of temperature sense, pain sense, and hyperæsthesia as in Figs. 5 and 6.

September 10, 1902. Marked atrophy of muscles. Abdomen periodically distended, relieved by enemas.

September 21, 1902. Considerable pain and twitching in muscles of abdomen, arms, and legs.

October 1, 1902. Right arm; can use muscles of shoulder, biceps, triceps, extensors of fingers and wrists, and very slight motion in flexion of fingers. Left arm considerably weaker than right. Can use muscles of shoulder biceps and muscles of forearm.

FIG. 5. FIG. 6.



Front. Back.

//// = Temperature sense. \\\\ = Pain sense. oooo = Hyperæthesia.

October 10, 1902. Right leg; can flex, extend, and adduct right thigh; can flex and extend knee fairly vigorously with weak action of muscles of calf and anterior tibial muscles. Left leg, very slight power in muscles of left thigh, no power in muscles of left leg.

October 20, 1902. Gaining slight control of muscles of back, especially on right.

November 15, 1902. Now lacks motion in muscles of respiration and abdomen. No cystitis and no bed-sores.

November 30, 1902. Gaining in every way; can sit up in chair without assistance; can move wheel-chair a little with right hand.

Disturbances of sensation mapped out in Figs. 5 and 6 on date of August 22, 1902, have nearly disappeared, and areas are blurred and indistinct.

December 12, 1902. Occasional gastric disturbance.

January 1, 1903. Can pass urine voluntarily, but cannot empty bladder. Good control of sphincter ani. Flexor muscles gaining faster than extensor muscles. Can feed himself with right hand.

January 17, 1903. Cannot hold anything in left hand.

February 18, 1903. Can use both hands to wheel himself around in chair. Urine examination finds color normal, acid, sp. gr. 1029, albumen slight trace, sugar absent. Rare hyaline cast with fatty renal cell adherent, considerable pus, few medium size and small round cells.

March 6, 1903. Chill, vomiting, temperature, epigastric pain, distention. No abdominal spasm. Lungs negative.

March 10, 1903. Chills, pain on left side of abdomen. Slight tenderness over left kidney. No plasmodia. White count, 9000.

April 1, 1903. Out in chair apparently in good condition; can hold book in both hands for reading. Moderate cystitis.

May 1, 1903. More improvement on right side than on left; can sit up and raise himself with his arms, but cannot stand.

May 14, 1903. Urine examination, pale, clear, alkaline, sp. gr. 1018, trace of albumen, sugar absent. Many triple phosphate crystals, much pus, considerable normal blood, rare caudate cell, several small and medium-sized round cells.

May 20, 1903. Chill, fever, pain on left side of abdomen. No tenderness over kidneys. White count, 14,000. Increased to 20,500 in three days.

May 21, 1903. Urine examination, color normal, acid, sp. gr. 1012, trace of albumen, sugar absent. Many hyaline and fine granular casts, few with renal cells and blood-corpuscles adherent, considerable pus.

May 25, 1903. Chills more frequent with pain in left side. More marked cystitis with renal complication.

May 30, 1903. Suddenly became much worse, chills, great weakness and difficulty in breathing. Weakened rapidly, and died June 5, 1903.

Autopsy.—June 6, 1903, by Dr. Oscar Richardson.

Anatomical diagnosis: right nephrolithiasis, occluding stone in the right ureter; pyelonephritis; cystitis; hyperplasia of spleen; small infarct in middle lobe of right lung; dural adhesions in region of upper cervical portion of spinal cord.

On opening the spinal canal, the cord presents nothing remarkable until the upper cervical region is reached, where the dura is firmly adherent to the vertebræ and to the cord. Outwardly there are no deformities of the cord. Entire cord placed in hardening fluid.

Kidneys combined weight 440 grammes. Capsules strip leaving smooth surface. Pelvis of right kidney dilated, its mucosa grayish-red to black, bathed in semifluid, dirty yellow purulent material. Calices markedly dilated with concretions. Right ureter dilated, occluded by small yellowish stone one and one-half centimetres in greatest diameter. Two pockets containing stones at pelvis of kidney. Left kidney and ureter not remarkable. Bladder contains foul fluid.

I wish here to express my appreciation of the courtesies extended me by the Clinico-Pathological Laboratory of the Massachusetts General Hospital, and especially for the interest of Dr. Oscar Richardson, who performed the autopsy and removed the brain and spinal cord, placing same in hardening fluid, and later staining and mounting a series of eighty-five cross-sections from the pons to the coccygeal segments, which permitted me to reproduce characteristic sections of each region of the cord to illustrate the tracts of degeneration of nerve-fibres. The sections were stained by the W. Ford Robertson's [10] osmic acid method.

Cross-sections of the cord at seven levels have been selected, —one through the second lumbar segment, the sixth dorsal or thoracic segment, the eighth cervical segment below the lesion, one through the lesion at the sixth cervical segment, above the lesion at the third cervical segment, one through the oblongata, and through the pons.

With transverse lesion at any level of the spinal cord, one expects to find evidence of descending degeneration of motor

tracts below the lesion, of those axones which have been severed from their central cells. With this, also, is a short descending degeneration of some collaterals from sensory fibres. Ascending degeneration occurs above the lesion of such sensory fibres as have been severed from their nerve-cells in the dorsal root ganglia.

The following sections have been carefully compared with those pictured in Bruce's atlas, and the levels accurately established.[11]

PATHOLOGICAL ANATOMY.

*Right Half of Cord.**—Ventral root normal. Direct pyramidal tract shows degeneration of a few scattered fibres. Motor cells in ventral horn more numerous and more pigmented than on opposite side. Crossed pyramidal tract shows marked degeneration, with scattered normal nerve-fibres, which increase in number towards the lateral limiting area. Dorsal root not degenerated on either side. (Fig. 7.)

Left Half of Cord.—Ventral root shows degeneration with scattered normal nerve-fibres. Direct pyramidal tract slightly more degenerated than on the right side. Motor cells in ventral horn fewer and contain less pigment than on the right side. Crossed pyramidal tract shows larger area of degeneration with fewer scattered normal nerve-fibres.

General.—A few scattered fibres of degeneration of direct pyramidal tract are seen in the lumbar segments, but this tract cannot be followed to show degeneration in either sacral or coccygeal segments. No degeneration in dorsal columns (short sensory pathways affected by the lesion stopped at a higher level). Of the pyramidal tracts, the greatest degeneration is in the crossed. Cross pyramidal tracts diminish in lower segments. Collaterals, probably representing the reflex arc, are seen going from the dorsal to the ventral horn. These, as would be expected, do not show degeneration.

Right Half of Cord.—More marked degeneration of direct pyramidal tracts than on opposite side. Crossed pyramidal tracts show less marked degeneration than on opposite side. Clark's

* I wish to state at this point that by the words left and right half of the cord is meant from the reader's position viewing the diagram.

*FIG. 7.—Degeneration of motor (pyramidal) tracts. Second lumbar segment. 1. Direct pyramidal tract. 2. Crossed pyramidal tract. 3. Substantia gelatinosa of dorsal horn. 4. Ventral horn. 5. Dorsal root. 6. Ventral root.

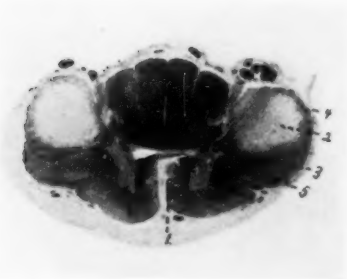


FIG. 8.—Degeneration of motor (pyramidal) tract. Sixth dorsal segment. 1. Direct pyramidal tract. 2. Crossed pyramidal. 3. Column of Clark. 4. Direct cerebellar tract. 5. Gower's tract.

* The photomicrographs were made by Mr. Louis S. Brown, at the Pathological Laboratory, Massachusetts General Hospital.

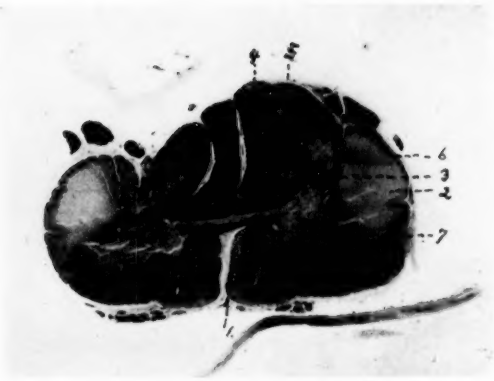


FIG. 9.—Degeneration of motor (pyramidal) tracts. Eighth cervical segment. 1. Direct pyramidal tract. 2. Crossed pyramidal tract. 3. Comma tract (Schultz's area). 4. Column of Goll. 5. Column of Burdach. 6. Direct cerebellar tract. 7. Gower's tract.

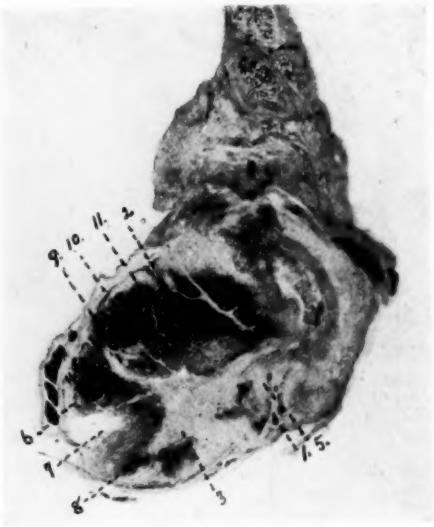


FIG. 10.—Section through the lesion. Sixth cervical segment. 1. Ventral fissure. 2. Dorsal fissure. 3. Ventral horn. 4. Fibrous tissue. 5. Direct pyramidal tract. 6. Direct cerebellar tract. 7. Crossed pyramidal tract. 8. Gower's tract. 9. Dorsal horn. 10. Column of Burdach. 11. Column of Goll.

column well defined on both sides. Direct cerebellar tract more defined on this side. (Fig. 8.)

Left Half of Cord.—Marked degeneration of direct pyramidal tracts slightly less than on right side. Motor cells show same changes as in previous section. Crossed pyramidal tract shows more complete degeneration than on the right side, though there are a few normal fibres.

General.—No degeneration in dorsal columns; this section is too low for degeneration of descending collaterals of sensory nerves affected by the lesion. Areas of all pyramidal tracts increase in higher levels. The inner side of Gowers's tract lies against the lateral ground bundle not sharply defined, as there is a considerable admixture of fibres.

Right Half of Cord.—Motor cells more numerous and more pigmented than on the left side. Direct pyramidal tract shows more degeneration than on left. Right dorsal root has small area of degeneration. Crossed pyramidal tracts show extensive degeneration. Comma tract at base of Burdach's column shows degeneration of short descending collaterals of sensory neurones. (Schultz area.). (Fig. 9.)

Left Half of Cord.—Crossed pyramidal tract shows most complete degeneration on this side. Direct cerebellar tract sharply defined.

General.—Distortion of the section probably artificial.

Right Half of Cord.—Adhesion of large mass of fibrous tissue. Great destruction of cord with irregular areas of degeneration and fissures caused by crush. The ventral and dorsal horns cannot be distinguished owing to their involvement in the lesion. Both motor and sensory tracts are degenerated, but not definitely outlined. Greatest degeneration around periphery. Dorsal root is degenerated. (Fig. 10.)

Left Half of Cord.—No mass of adhesion. Ventral horn quite definitely outlined, containing an occasional motor cell and small amount of pigment. Areas of degeneration more definitely outlined than on right side.

General.—This section, contrasted with those immediately above and below, shows the greatest amount of destruction. Destruction evidently greatest on right, though scattered normal fibres can be detected.

Right Half of Cord.—Ventral horns apparently normal, with

small amount of pigment in motor cells. Degeneration of Gowers's and direct cerebellar tracts more marked on this side. Marked degeneration of the columns of Goll and of Burdach. (Fig. 11.)

Left Half of Cord.—Marked degeneration of dorsal columns. Degeneration of Gowers's and direct cerebellar tracts.

General.—On each side the portion of Burdach's column adjacent to the dorsal horn is most perfectly preserved (middle root zone), showing that degeneration of the dorsal root was at a lower level, and that these fibres take a position nearer the dorso-median line as they ascend. Motor tracts do not show degeneration above the lesion.

In this section only ascending degeneration of sensory tracts is seen. The direct cerebellar tract shows more degeneration on left side. Gowers's tract, above and a little external to the inferior olivary nucleas and external to the nucleas lateralis, shows as a small area of degeneration. (Fig. 12.)

A number of observers believe that a portion of Gowers's tract continues directly or by relay into the Lemniscus mediales. Flechsig follows the tract into the oblongata as far as the region of the nucleas lateralis, where it lies close to the periphery (approximately the level of this section). Löwenthal carried the investigation of its distribution into the cerebellum.

The columns of Goll and Burdach cease in the gracile and cuneate nuclei respectively, therefore only those axones are degenerated in this section whose central cells lie at a higher level.

I am unable to detect degenerated fibres in this section. It is possible that a few fibres of Gowers's tract have ascended to this level and entered the Lemniscus medialis. This section is through the superior cerebellar peduncle. (Fig. 13.)

Summary.—High fracture of spine, viz., sixth cervical vertebra. There were present all the classical symptoms upon which authorities have previously based their opinion that operation was contraindicated because it suggested total transverse lesion with a crush of the cord beyond repair. The case was operated upon within twenty-four hours. The patient lived eleven and a half months, during which time there was marked and steady improvement; from a condition of total paralysis over an area represented in Figs. 1 and 2, the patient regained

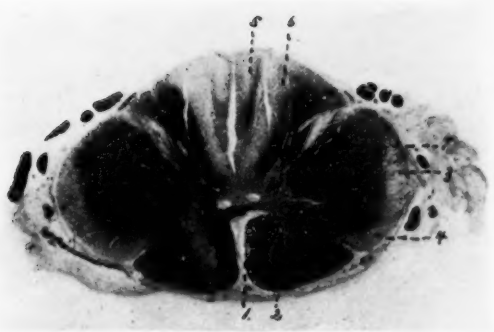


FIG. 11.—Degeneration of sensory tracts. Third cervical segment. 1. Direct pyramidal tract. 2. Ventral horn. 3. Direct cerebellar tract. 4. Gower's tract. 5. Column of Goll. 6. Column of Burdach. 7. Crossed pyramidal tract.

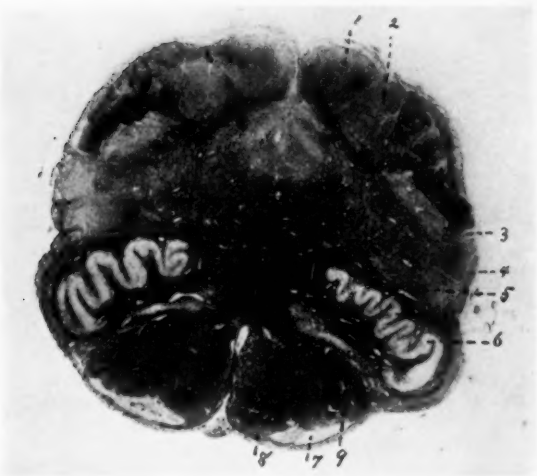


FIG. 12.—Degeneration of sensory tracts. Oblongata. 1. Nucleus gracilis. 2. Nucleus cuneatus. 3. Direct cerebellar tract. 4. Gower's tract. 5. Nucleus lateralis. 6. Inferior olivary nucleus. 7. Nucleus arcuatur. 8. Ventral pyramids. 9. Accessory olive.

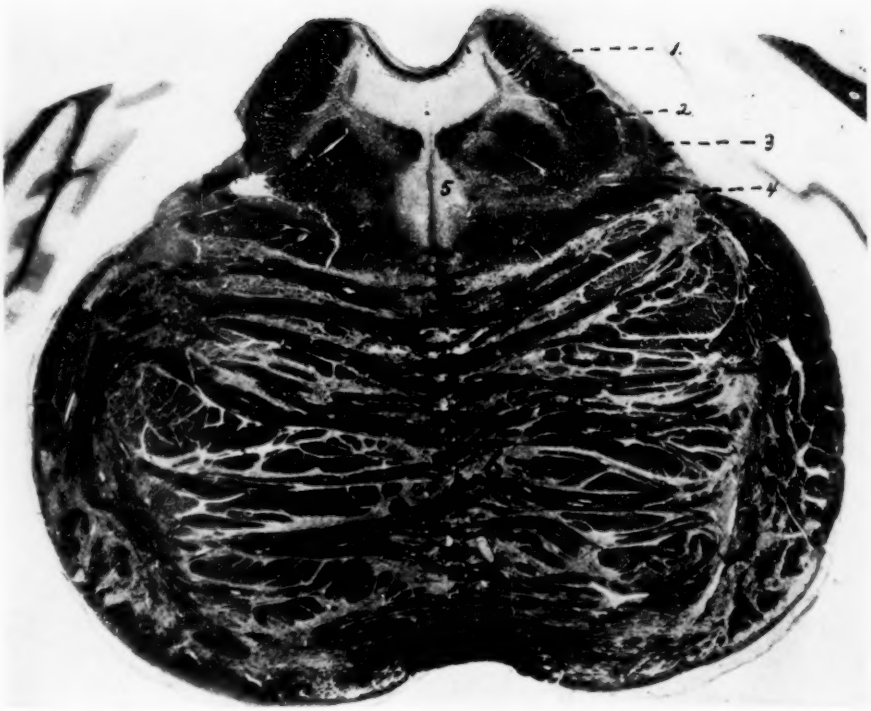


FIG. 13.—Section through superior cerebellar peduncle. 1. Superior peduncles. 2. Posterior longitudinal fasciculus. 3. Fillet lateralis. 4. Lemniscus medialis. 5. Nucleus centralis superior 6. Transverse and longitudinal fibres of pons.

nearly normal use of his hands and arms, and such improvement in the condition of his body and legs as to lead one to believe that if an unfortunate complication had not arisen, further improvement might have been expected. From a condition of total anæsthesia over the area above referred to, there was practically complete recovery by the ordinary tests.

Following death, a series of cross-sections of the spinal cord from the pons to the coccyx makes it possible to study the paths of degeneration following a crush at an unusual length of time after injury.

Pathological anatomy of the spinal cord shows that descending degeneration of all injured axones occurs in motor tracts below the level of the lesion and of the common tract, which is composed of short descending sensory collaterals from injured sensory neurones; it shows the occurrence of ascending degeneration of all sensory axones involved in the lesion.

The sections demonstrate that normal sensory and motor axones exist at the seat of the lesion, though their functions were interrupted at the time of injury, which suggested total destruction of the cord.

The operation showed fracture and depression of the spinous processes and laminæ, apparently lying against the cord. There was a blood-clot under the laminæ, none under the dura; condition of bodies of vertebræ not known.

Case II.—Mr. M., twenty-seven years of age, dived from a raft into shallow water on July 20, 1898, and sustained an injury to his spinal cord. Dr. Samuel J. Mixter was called in consultation two days later, and advised immediate operation, which he performed. At the time of the operation there was diaphragmatic breathing, complete paralysis of motion and sensation below the level of the lesion; reflexes were absent; apparently a case of total transverse destruction of the cord.

The laminæ of the sixth and seventh cervical vertebræ were found fractured and depressed, lying against the spinal cord. These laminæ were removed, the dura was opened, and no macroscopic lesion of the cord detected. There were no blood-clots, wound closed, healing without interruption.

The patient was removed to the Massachusetts General Hospital on August 2, 1898; he was seen in consultation with Dr. H. C. Baldwin, and the following conditions recorded. Temperature, 101.4° F.; pulse, 96; respiration, 20. Both arms can be slowly flexed, but cannot be extended. The left leg can be moved very slightly, the right leg can be flexed about 30 degrees, tactile sensation diminished in both legs, reflexes present, the left patella reflex being increased; there is incontinence of urine and fæces.

August 8, 1898. Tactile sensation of right arm normal, except over ring and little finger; tactile sensation of left arm normal. The supinator longus muscle of both arms contracts, though no contraction can be felt in either triceps; both hands can be slightly flexed, with very slight extension of fingers. Some wasting of interossei muscles; incontinence of urine persists.

August 18, 1898. Condition has not changed much; he has a little freer motion of arms and of right leg; no improvement in the left leg.

August 23, 1898. Temperature, 103.4° F. Phlebitis of left leg and thigh.

September 10, 1898. Left ankle clonus present, with slight motion of toes; also slight motion in flexion of left knee.

September 11, 1898. Recovery from phlebitis.

October 3, 1898. Left arm; no motion in extension of forearm, no motion of fingers, flexion of wrist and forearm present, fair shoulder movements, pronation of forearm, but no supination. Right arm; extension of forearm to right angle, good motion of wrist and forearm, good shoulder movements. Left knee and ankle can be slightly flexed; there is contraction of left adductors, causing slight adduction but no abduction, no flexion of left thigh, but slight power of extension.

October 27, 1898. Patient lifted his left foot six inches from the bed. Right arm can be extended and moved freely. Less improvement in motion of left arm with scarcely any power of extension.

Discharged from the hospital, October 27, 1898.

November 2, 1898. A letter regarding his condition mentions "steady improvement at home; he can move his limbs quite well, can hold things in his hand, and even feed himself a little."

On July 17, 1900, a letter was written by the patient in a plain, legible hand stating that his "right side is much better than

the left side in every way. My right leg is as good as ever it was, every muscle as good though not as strong." "Right arm all right, except slight contraction, which is growing less. Right hand fairly good, thumb and forefinger nearly all right in regard to movement, but the sense of touch is not as acute as formerly. The other fingers of right hand not bad, but not quite as good. Still quite a contraction in left arm, triceps very weak, and did not seem to be good for anything until six months ago. Left hand not very good, fingers close when the wrist is straightened."

"Left leg; toe-drop still exists, no ankle motion, tendon contracted back of the heel. The cords in back of left knee are a little stiff, and are inclined to contract a little, though left leg can be straightened perfectly. General health excellent; can walk a half mile without resting, and am getting stronger. Took a trip of 200 miles with five changes without difficulty."

On April 3, 1901, the patient was examined by Dr. H. C. Baldwin, who kindly allows me to use the following notes:

"Patient's weight is 135 pounds. He now goes about with one cane. Deltoid muscles firm and of good strength. Slight wasting of left supra- and infraspinati muscles, but their movements are normal. Biceps muscles in good condition, and equally strong. The right triceps muscle is strong, the left one is feeble." Right arm can be fully extended, the left arm can be extended to an angle of 145 degrees, representing marked improvement in each. Complains of numbness in three ulnar fingers of right hand. There is considerable wasting of left forearm and hand, can flex the fingers of left hand moderately, but cannot separate fingers or use extensors of fingers. Supinator longus contracts. Disassociation symptoms, especially in the hands and over most of left arm. Knee-jerks are exaggerated, Babinsky reflexes present, left ankle clonus. The left leg is smaller and weaker than the right. Toe-drop present. Disassociation symptoms over both legs.

On December 2, 1903, the following notes were made by Dr. Baldwin, who gives permission to use them:

"The patient is engaged in insurance business and weighs 130 pounds. His condition has improved in every way; muscles are stronger, and can be used better. Can take off his collar and tie and put them on again, which is a distinct improvement.

"Tactile sensation in the thumb and forefinger of right hand is still absent.

"The shoulders are exceedingly well developed. The left triceps is stronger than at last visit, and the arm can be extended to 160 degrees. Condition of the legs same as at last visit."

The question is pertinent: What is the value of operation in injuries to the spinal cord?

1st. It removes depressed fragments of bone apparently lying against the cord; 2d, It removes blood-clots; 3d, Allows the escape of exudate and makes room for inflammatory thickening; 4th, If extensive hæmorrhage is present, either extra- or intradural, it relieves pressure from the cord. Cases in literature have shown that degeneration from pressure appears within four days; if a cord is injured by crush and not totally destroyed, the continued pressure of a blood-clot may succeed in completing total destruction. 5th, Traumatic spinal œdema may be of such extent as to demand greater space for enlargement of the cord to avoid further destruction of fibres; 6th, There is absolutely no method by which one can early diagnosticate slight or great pressure of a fragment of bone, the pressure of a small or a large hæmatoma, whether there is a momentary pinch of the cord or constant pressure; 7th, The fact that the cord looked normal in these cases does not preclude the possibility that pressure had existed, nor prove that a condition had existed in which drainage and relief of pressure were not distinctly beneficial; 8th, The patients did not suffer from any ill effect of the operation *per se,* the dangers of operation are very slight compared to the possible benefit to be derived therefrom; and the further satisfaction is obtained that the surgeon *knows* that continued pressure does not exist.

I feel justified in concluding, from the history and symptomatology, from the favorable progress, and from the study of the pathological anatomy in Case I, that operation is indicated in such injuries.

The statistics of fracture of the spine, contrasting operated and unoperated cases, the percentages of deaths, and average duration of life, have been concisely given in the *Journal of Nervous and Mental Disease*, 1902, Vol. xxix, by Dr. George L. Walton.

What observations can be drawn from these cases of unusual duration of life?

The symptoms of both cases were typical of a complete transverse lesion.

Kocher regards operation as out of the question in total transverse lesions. There was no sign to even suggest a partial transverse lesion, nor to suggest whether the cord had been momentarily pinched, or was being permanently pressed upon by blood-clot, laminæ, or fragments from the body of a vertebra, or by dislocation of vertebræ. All the material at hand was a completely paralyzed body with consciousness, slight motion in flexion of arms, and an unaided diaphragm.

Among the exhaustive methods of diagnosis, the X-rays may be invaluable, but too frequently are unsatisfactory.

There is one class of cases which has been reported, viz., extreme fracture of the vertebral bodies with extreme displacement, demonstrated by the Röntgen rays, in which it is wiser to resort to rectification and fixation,—the wisdom of this procedure being upheld in the report of a case.[12]

What, then, is the problem confronting the surgeon? Should the use of X-rays be unavailing in reaching a decision, the problem, without operation, results in one of speculation. I must use that word in the absence of more absolute information in regard to pressure of clot or bone upon the spinal cord.

If we start with the assumption that typical symptoms of a complete transverse lesion are to be accepted as infallible, the surgeon should not operate on such cases as these of which it is the object of this paper to report; but these cases prove as striking examples that typical symptoms of a complete transverse lesion are not infallible, in which case the surgeon is not doing all in his power to relieve the patient's condition unless he operates.

A case[13] is reported where there were classical symptoms of a complete transverse lesion in the region of the upper dorsal vertebræ. The arches of the three upper dorsal vertebræ were found depressed and impacted at operation and removed, followed by steady improvement.

How is one to decide whether a cord is crushed beyond repair or not? There are no symptoms which establish, otherwise than by their persistence, irremediable crush of the cord.

How long should a surgeon wait? Shock is the principal factor to be considered in this connection. As a rule, operation on most, if not all, of the cases can be delayed a few hours until a greater stability of the nervous system is regained. A certain few cases might impress one with the necessity of immediate operation.

It has been suggested by one operator (Kocher) that one may operate later when long-continued pressure is shown; but having waited that length of time, why is there, then, not a hesitation whether one has to do with pressure of a fragment, or a condition resulting from a momentary crush that has proved irremediable, and likewise stay the hand of the surgeon?

A case [14] is reported in which operation was delayed four days; marked degeneration was found at autopsy the fifth day. Why then delay for other than the constitutional condition—shock? I quote Dr. Walton: "We have no symptoms from which we can assert at the outset that the cord is crushed beyond at least a certain degree of repair, and that early operation in all doubtful cases will not only accomplish all that late operations would do, but also perform it before adhesions and permanent deformity exist by pressure from whatever cause."

Keen [15] is quoted as saying, if immediately after the accident the knee-jerks are absent and remain so, operation is contraindicated.

How long should one wait for this sign? and while waiting, may not pressure do irreparable injury? In Case I, knee-jerks did not return for twelve days; and it has been shown that degeneration may appear within four days after injury.

Case I, from its clinical aspect, was diagnosticated total transverse destruction of the cord at time of injury. Many of the fibres were not destroyed, as proved by the marked improvement in the symptoms, and also by microscopical examination, which a year after injury showed the presence of normal nerve-fibres in the degenerate area.

It seems reasonable, then, to assume that even with the appearance of total destruction we have to do with a condition which for a time has interrupted the registration of sensation and motion on the cerebrum over certain neurones, which after regaining equilibrium will resume their functions.

Though fibre degeneration has persisted through the year following the operation, the suggestion seems pertinent that the steady improvement indicates an increased transmission of impulses through the remaining scattered fibres; the analogue of which is found in the increase of functions occurring in the kidney after unilateral nephrectomy, showing the power of nature to accommodate herself to adverse conditions.

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ON THE PRESENT STATUS OF THE OPERATION OF GASTRO-ENTEROSTOMY.[1]

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THE mortality of gastro-enterostomy has steadily declined from 60 or 70 per cent. until now it stands between 15 and 30 per cent., as given in the majority of statistics. This high death-rate for so comparatively simple an operation is somewhat complex in analysis; but two causes, which are to a considerable extent capable of elimination, seem to be visible in nearly all of the bad results, and modifications of the original operation have been and still are being brought forward to correct them. One of these causes has to do with the ever-present but unforseeable possibility of occlusion of the alimentary tract at or near the point of anastomosis, and the other, which follows the first almost as a corollary, is dependent upon the condition of the patient. Only those who are beyond hope of recovery are, as a rule, deemed ready for so serious an operation. The chance that uncontrollable vomiting may occur in any case operated in the usual way, and lead to a miserable death, is well understood by the medical attendant, and is more or less feared by the surgeon, and many sufferers from entirely relievable distress are allowed to reach such a stage of exhaustion that any interference is rather a means of providing euthanasia than therapeutics. Hence, any method of operating which has given a mortality almost as low in benign cases, as the interval operation for appendicitis, should be carefully considered, for there seems to be such a method; and it is the more worthy of emphasis as, judging from a rather careful study of the literature, it seems to have received little general recognition. If the

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medical man or general practitioner is once convinced, as now seems possible, that gastro-enterostomy or, preferably, gastro-duodenostomy has been deprived of most of its earlier terrors, there will follow a great advance in the treatment of many benign though disabling and sometimes dangerous disorders of the stomach.

The causes of death as described in their usual order of frequency are shock, collapse, asthenia, or inanition, all practically the same when one bears in mind the extreme debility of the patients usually considered to require so (statistically) serious an interference. The operation too often has been one of last resort. Then come infection and peritonitis with pneumonia a close third. Pneumonia might be classified with asthenia as apt to occur after any abdominal operation upon asthenic subjects, especially after the deep narcotization so frequently necessary to obtain relaxation in epigastric wounds. It has been variously ascribed as due to inhalation of stomach contents,—though with proper care this ought not to happen. —to the difficulty of coughing in the presence of an abdominal injury, and to hypostatic congestion. In the majority of instances, however, it seems as unavoidable as the causes of death which stand first in frequency.

Infection, to be sure, should be escaped, and with the improvement in technique of intestinal operations has very much decreased. But here again the asthenia of the subject, usually considered ready to require a gastro-enterostomy, is largely responsible. Absolute asepsis is practically unattainable at present in any form of operation which has to do with the interior of the alimentary tract. The perfectly healthy peritoneum can take care of a great deal of sepsis, but the damaged abdomen of a weakly person is quite another thing. Nevertheless, there is still room for improvement as regards infection.

The fourth most common cause of death, and in some statistics and in the minds of many surgeons it ranks much higher, is obstruction in one form or another. "Vicious circle" vomiting, as it is aptly designated, caused a fatal ending in the second gastro-enterostomy on record, and the numerous meth-

ods brought forward to escape it can justly be regarded as directly or indirectly the underlying cause of much of the other mortality. All but two, or at most three, of the methods which have been employed are "loop" operations,—that is, a loop of jejunum (or ileum) has been united to the front or back of the stomach and carried in front of the colon or behind it through the transverse mesocolon. The vicious circle vomiting when it occurred was then the result of escape of stomach contents into the proximal instead of the distal leg. The distal leg is mechanically occluded by the displacement of its lumen from the opening in the stomach. There may also be a physiological factor in the process, as Chlumski has shown by animal experimentation that filling of the duodenum inhibits the peristalsis of the stomach. The attempts to avoid this accident by giving the loop some particular position in relation to its mesentery, or its legs, or the stomach, or the colon, or by making an entero-anastomosis, led to too prolonged operations, with their numerous dangers and the consequent use of mechanical appliances to save time,—and to many infections, and to intestinal obstruction by volvulus of the loop or by hernia and strangulation over it of the gut lower down. But experience with the loop operations demonstrated the necessity of making the fistula as near the greater curvature of the stomach as possible, and also the value of entero-anastomosis as the base of the legs of the loop. Aside from the risks of a long operation and the maximum danger of infection by opening the alimentary tract in three places, there need then (after entero-anastomosis) be no reasonable expectation of "vicious" vomiting. If it occurs, it is an unavoidable accident inherent in all the loop operations.

Another result of these experiences has been the survival of the Murphy button against all mechanical competitors. One surgeon of very large experience, who always uses the loop, told me that before he employed this contrivance he often had serious vomiting, sometimes followed by death; but since he began to employ the button, in some fifty or sixty cases, he has had none of this trouble. In general, this seems to agree with other reports. The accidents usual with the button have some-

times happened, but dangerous or fatal vomiting is at least rare, apparently because the button, by nearly filling the lumen of the gut, is a hindrance to sharp kinking or spur formation. Of the other methods not involving any loop, the first to be mentioned is gastro-duodenostomy. The union of the stomach with the descending duodenum, introduced by Billroth for restoring continuity after pylorectomy and improved by Kocher, had been utilized in certain cases of benign stenosis by Henle and then by Villard, but lately has been advanced by Finney as a substitute for all gastrojejunostomies. In the Finney operation its prototype, the old Heinecke-Mikulicz plan of pyloroplasty, is amplified by transposing the transverse anterior division of the pylorus into a horseshoe-shaped ∩ incision, six to ten inches long, through the under part of the pylorus and adjoining greater curvature of the stomach and descending portion of the duodenum. The opening is thus large, in the lower part of the stomach, and provides free drainage. It is anatomicallly and physiologically correct, and, when circumstances permit, the few written reports and the many verbal ones I have heard seem to favor it without qualification. But gastrojejunostomy is undoubtedly a necessity for the greater number of cases.

Roux's method "en Y" attempts to solve the difficulty of the loop by section of the gut at the summit with implantation of the distal end into the stomach, and of the proximal end into the intestine below, but the numerous unpleasant possibilities, the chief of which are the time it requires and the increased risk of infection, have not made it popular. The other operation, which does not involve the use of any loop, is the one to which I wish to call attention. It is that described by Petersen as used in Czerny's clinic. He reports 215 gastrojejunostomies with only a 5 per cent. mortality from all causes in benign cases, and among these there was not a single instance of serious vomiting and no obstruction. It is based on the simple anatomical principle that the first few inches of the jejunum lie directly in contact with the posterior surface of the stomach, separated from it only by the non-vascular portion of the mesocolon, and

that this part of the jejunum descends vertically and without any turns. To perform the operation, after opening the abdomen by a median four-inch incision just above the umbilicus, the position of the greater curvature is noted. The transverse colon and omentum are turned up on the thorax, and the posterior surface of the stomach is exposed by tearing through a portion of the mesocolon, which is free from vessels. An area about two inches square is thus exposed, and attached at its margin by four Lembert stitches to the edges of the rent. The plica duodenojejunalis is then felt for and seen, and, while the gut is held up perpendicularly to the spine, it is attached from two to four inches below its origin, by a row of Lembert sutures placed transversely to the long axis of the gut around one-half the circumference of its free border to the opposite exposed posterior stomach wall. The ends of the first and last stitches are left long as guides. In front of this the stomach and gut are opened, and the cut edges sutured or a Murphy button is inserted. The long guide and end stitches behind are then used as starting-points for another row of Lembert stitches to close off the fistula. The omentum and transverse colon are replaced and the abdomen closed. The jejunum is thus anastomosed in its normal position, and without any twists, to the adjoining posterior stomach wall. There is no loop to become occluded, and no chance for volvulus or hernia above it. In Czerny's clinic the Murphy button, supplemented by a ring of Lembert sutures outside, has generally been employed. Mikulicz (after Socin) advises an opening on the free border of the gut, transverse to its long axis and suture only. But the button is quicker and, if properly reinforced by suture externally, leaves little to be desired. Liquid nourishment can be administered as soon as the effects of the ether have passed off. Retention of the button in the stomach, in spite of the numerous instances of its harmlessness (in one case it was retained nearly seven years) may be avoided by the use of Hildebrand's or Weir's modification of the instrument. But there is no absolute guarantee that even this will not fail, as I know of one

case * in which such a button (apparently inserted by Dr. Weir himself) was retained in the stomach, and gave rise to symptoms enough to require another operation for its removal. And in this connection it is worthy of note that a retained button is reported as the cause of death in at least one patient from hæmatemesis. The autopsy showed the button embedded in an ulcer of the stomach with an open vessel under it.

A line of sutures externally to reinforce the button has also proved fatal by too much narrowing of the lumen of the gut; but this is perfectly avoidable, and such an error should not count too much against the additional security, although reinforcing sutures evidently favor retention of the button in the stomach by narrowing the lumen of the gut through which it must pass to escape properly. The following cases, which were operated upon at the St. Francis Hospital, serve well to illustrate this Czerny-Petersen method.

CASE I.—M. H., thirty-two years old, laborer, has had dyspepsia for the past two years, which during the last six months has grown much worse. Lately there has been vomiting. Pain in the abdomen is constant, especially after taking food. There has been a very marked loss of flesh and strength, and also a troublesome cough with some dyspnœa on exertion.

Physical examination revealed consolidation of the left apex and many tubercle bacilli in the sputum, with a tumor in the epigastrium about the size of an orange. As the patient was in such distress from the pain and vomiting, operation was performed on July 27, 1903. A median three-inch incision just above the umbilicus revealed a pyloric tumor and a much dilated stomach. The tumor had all the gross appearance of carcinoma. There were no adhesions, and, with the exception of a few enlarged lymph nodes in the immediate neighborhood, there were no metastases. This was an excellent case for removal, but the general condition forbade any more than the briefest interference. A retrocolica posterior gastrojejunostomy was therefore accomplished, with the aid of a Murphy button reinforced by suture, within three inches of the beginning of the jejunum. After stitching the exposed

* Personal communication from Dr. J. A. Blake.

posterior stomach wall to the edges of the opening made in the mesocolon, the jejunum was drawn taut, so that the portion between the plica duodenojejunalis and that in the grasp of the assistant's fingers formed a straight line perpendicular to the spine. The point selected for the fistula was one slightly above that where, in the position of the parts noted in first opening the abdomen, the greater curvature crossed the beginning of the jejunum. Thus the latter, when the stomach and intestine were replaced, descended vertically downward from the plica to its first turn below the fistula.

Recovery was uneventful. There was no vomiting and no pain, and liquid feeding was begun that night, owing to the extreme asthenia. The patient was out of bed at the end of two weeks, and left the hospital shortly afterwards without having passed the button. No change was noted in the tumor, which seems to confirm the belief in its malignancy.

I have since heard that death followed at home sometime in November from phthisis, without the return of vomiting or abdominal pain. The relief of vomiting was expected, but the disappearance of the pain impressed me greatly. The operation would offer a reasonable hope of relieving much of the suffering of gastric carcinoma, even when unaccompanied by pyloric obstruction.

CASE II.—A. D., fifty years old, female servant, was received in the medical service with a history of pain in the region of the stomach, increased after taking food, and of vomiting. Of late the vomiting had become more frequent, and there had been some loss of flesh. Physical examination revealed a rather feeble and prematurely old-looking woman, with marked epigastric tenderness on pressure just to the left of the median line. No tumor was perceptible. After three weeks of medical treatment without improvement, and with a diagnosis of gastric ulcer, operation was performed on August 18. A median four-inch incision, having the last inch below the umbilicus, revealed a somewhat dilated and thin-walled stomach. No other gross abnormality was noted. A retrocolica posterior anastomosis was carried out as before with the Murphy button. The fistula was placed about three and one-half inches below the plica duodenojejunalis. Liquid feeding was

begun the following day. There was no vomiting and no complaint of pain, and the patient seemed well on the way to recovery, but about a week later a bad cystitis developed from catheterization. This was followed by uræmia, and death on August 31. Autopsy demonstrated that the anastomosis was perfect, though the button had fallen into the stomach. The latter showed a chronically inflamed mucosa, and had become more or less contracted and funnel shaped, with the fistula at the apex of the cone. No ulcer nor its cicatrix was discovered. The cause of death was a suppurative cystitis and pyelonephritis. The other organs were normal.

This was a case of bad chronic gastritis with dilatation, and the constant distress with the loss of flesh and strength and the inability to work seemed to justify interference. Medical treatment had failed to give any relief to the symptoms, but after the gastrojejunostomy these entirely disappeared.

CASE III.—M. P., forty-five years old, housewife, was sent to the hospital with a diagnosis of gastric ulcer or carcinoma. There was a history of epigastric pain, increased by taking food, and occasional vomiting, in which there had been some blood. During the past six months she had lost forty pounds in weight. There seemed to be a small tumor in the region of the stomach, and an absence of free hydrochloric acid was noted. While under observation and medical treatment no improvement took place, and therefore on September 26 an exploration was undertaken.

After the abdomen was opened by a median four-inch incision just above the umbilicus, the liver was found to be cirrhotic; but, as the stomach showed a slightly thickened and congested area anteriorly near the pylorus and the gastric symptoms had been severe, gastrojejunostomy was deemed proper, and this was accomplished by the Czerny-Petersen method as in the previous cases, but without the button. The gut was opened transversely around its free border to an extent equal to half its circumference and at a point about three inches below the plica.

Recovery was uneventful. Liquid feeding was begun the next day, and all symptoms disappeared, and the patient left the hospital at the end of three weeks, professing to be relieved, but without any noticeable gain in weight.

I have since heard that there has been some return of her stomach trouble, and believe this may be due to the cicatricial contraction of the fistula. At any rate, there was no difficulty until the contraction might have taken place. Mayo has called attention, in cases somewhat like this, to the need of artificially narrowing a perfectly patent pylorus to prevent subsequent obliteration of the new fistulous opening. This history, by the way, is not meant to suggest gastrojejunostomy as a routine treatment for the stomach complications of hepatic cirrhosis. It was employed here to relieve a very probable gastric ulcer, which, to be sure, could not be verified, as the interior of the stomach was not explored. The immediate success was marked, and I think the explanation of the recurrence of symptoms reasonable.

Case IV.—A. R., twenty-eight years old, housewife, was admitted to the medical service in June with a typical history of gastric ulcer, including hæmatemesis, and while under treatment developed an abscess appendicitis, for which I operated in July. After this had healed, as the gastric distress and vomiting persisted to such an extent that almost no food could be retained and the woman seemed starving to death, I performed a gastrojejunostomy by the Czerny-Petersen method with the Murphy button, as the patient could evidently stand only the briefest interference. The fistula was placed about three inches below the end of the duodenum. The button was reinforced by a continuous suture externally.

Recovery was uneventful. Liquid feeding was begun that night, and from then on all complaints ceased. There was no more pain and no vomiting, and there was a very noticeable gain in the general health. At first this was quite rapid, but later the improvement was more gradual, and seemed the slow gain from a long and severe illness. She left the hospital in good condition, although there was some dyspepsia towards the latter part of the time she was under observation.

In this case I believe again, as in Case III, that in the presence of a perfectly patent pylorus the new fistula underwent cicatricial contraction, and its benefit was at least diminished. The primary improvement and the subsequent cessation of improvement are certainly suggestive.

CASE V.—A. H., fifty years old, mechanic, had a Heinecke-Mikulicz pyloroplasty for benign stenosis performed by me on December 29, 1902. During the next six months he gained nearly thirty pounds in weight, and then in July, 1903, the former symptoms began to recur. These grew gradually worse, and therefore on October 5, 1903, I made a gastrojejunostomy by the Czerny-Petersen method, placing the anastomotic opening, which was accomplished with sutures, about three and one-half inches below the duodenum. The condition of the pylorus in this operation was interesting. At the completion of the last operation, nine months previously, the index-finger, invaginating before it the anterior wall of the stomach, could easily be passed into the duodenum. Now the pylorus was found practically closed, surrounded by adhesions and high up under the liver.

Recovery was uneventful, and on the eleventh day afterwards I found the patient at work in his shop. All symptoms have been completely relieved, except that he tells me he has to be a little more careful of his diet than formerly. Fermentable foods are apt to cause dyspepsia, but otherwise he is as well as ever. In the months immediately following the first operation he could eat anything, whereas now sugars, starches, and cabbage are not so easily disposed of. This history would seem to indicate, as might be supposed, that gastroduodenostomy is preferable to gastrojejunostomy.

In these five cases there was one death three weeks after operation from an ascending infection of the urinary tract. But in none of them was there anything but satisfaction in the entire relief of symptoms. As they represented respectively cancer, dilated or atonic stomach, ulcer, chronic gastritis (and ulcer?) with hepatic cirrhosis, and benign stenosis of the pylorus, they can be said to be examples of successful treatment of nearly all kinds of chronic gastric disorder. And certain enthusiasts have extolled the operation as a panacea in this class of diseases. It is, however, undeniably excellent for benign and malignant stenosis of the pylorus, and for ulcer and atonic dilatation of the stomach. Gastroduodenostomy is physiologically better when possible, and should be given the preference. But when the retrocolica posterior anastomosis is impracticable, an antero-

colica anterior loop operation combined with entero-anastomosis may have to be undertaken. There are now a considerable number of observations on record of the late results of gastro-enterostomy for benign disease, especially for ulcer. One of the first and most frequent bad results is contraction of the fistula and recurrence of the symptoms. To prevent this, Mayo recommends a purse-string suture about the pylorus. A plication by infolding of the anterior stomachic wall at this point would be simpler, and ought to be equally effective. At any rate, in the presence of a patent pylorus some method of artificial occlusion is necessary to obtain permanence of results. A retention of the Murphy button can generally be avoided by using Weir's or Hildebrand's instrument, although the assurance as noted above is not very strong. In the presence of hyperacidity, diarrhœa for a longer or shorter time, generally a week or so, may be expected. Peptic ulcers in the jejunum have several times been observed, and some of these have caused death by perforation or hæmorrhage. But as a general thing the motility of the stomach has been vastly improved. Some bile can be always detected in the stomach contents, but never seems to have caused unpleasant symptoms. The development of a sphincteric action in the fistula is questionable, and a matter of more academic than practical interest. There has often apparently been found an impaired digestion for fats, and consequently an excess of such articles of diet is to be avoided. But as a result of my own rather limited experience and from what I can gather from others, a gastro-enterostomy as described above is a most satisfactory operation, and one which sooner or later is certain to come into much more general use than formerly for chronic benign gastric disease. It is already universally accepted for pyloric obstruction, but not as early in the course of the obstruction as it should be. For dilated and atonic stomachs it is undoubtedly preferable to medication. Little can be expected in the way of restoration of the secreting power of the mucous membrane in such a condition, and the drainage is better by gastrojejunostomy than by gastroduodenostomy. For ulcer, with its dangers from hæmorrhage and

perforation, gastroduodenostomy where possible should be the choice. But adhesions which may be present around the pylorus ought to negative the prolonged operation usually necessary to mobilize the parts for accomplishing a proper stomach-duodenum fistula. A simple pyloroplasty too often has failed, and an opening four or five inches in vertical diameter is only possible when the parts are freely movable.

The permanency of any artificial opening and its desirability in the presence of a patent pylorus is of course an ever-present problem. Contraction seems inevitable. The Finney operation escapes it as much as any wound can, and that, in the absence of adverse reports, is an unanswerable argument in its favor. But when this method is impracticable, as it so often is, should the pylorus be artificially closed to insure permanency in the jejunal fistula? Will the fistula not remain open until the conditions for which it is made are cured and then close, leaving everything as it should be? Apparently not. The fistula will close in the majority of instances, at least before a permanent cure is obtained. And therefore it seems necessary to close the pylorus, as only under such conditions has experience shown that the new opening will remain patent. A peptic ulcer of the jejunum is about the worst which can be expected, and with a gastroduodenostomy a similar ulcer in the duodenum is at least equally probable. Gastrojejunostomy, however, as shown in Case V, may involve some minor dyspeptic symptoms. The ulcers, though rare, are serious possibilities inherent in both methods, and the dyspepsia seems slight; therefore, when gastroduodenostomy is impracticable, gastrojejunostomy with closure of the pylorus is far preferable to leaving a patient to suffer from a far worse condition than an occasional discomfort.

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Villard. (Centbl. f. Chir., 1901, p. 46, and Rev. de Chir., 1900, No. 10.) Gastroduodenostomy like Henle.

Weir. (Medical News, June 3, 1899, p. 680.) Murphy button introduced through loop, and entero-enterostomy made by pressing together through unopened gut.

Wölfler. (Centbl. f. Chir., 1881, p. 705.) Original operation.

Wölfler. (XII Germ. Surg. Cong., 1883.) Constriction of afferent leg by circular silk ligature.

Wölfler. (XII Germ. Surg. Cong., 1883.) Valve from stomach wall over afferent leg.

There are in addition the numberless methods by mechanical appliances used in intestinal anastomosis, including Ech's instrument for portal-caval anastomosis.

Statistics and Results.

Braun. (XXIII and XXIV Germ. Surg. Congress.) Peptic ulcers of jejunum.

Brenner. (Arch. f. klin. Chir., 1893, No. 45.)

Chlumski. (Beitr. z. Chir., xx, Hefte 1 and 2.)

Cordier. (Journal of the American Medical Association, March 1, 1902.) Case of retained button lasting seven years.

French Surg. Congress, 1897.

Gibson. (Annals of Surgery, 1898, p. 284.)

Jaworski. (Deutsch. med. Woch., 1899, No. 14.) Late results.

Kaiser. (Deutsch. Zeits. f. Chir., Vol. lxi, 294.) Late results.

Kappeler. (Deutsch. Zeits. f. Chir., Vol. xlix, p. 113.) Late results.

Kelling. (Arch. f. klin. Chir., Vol. lxii, 1900, p. 5.) Late results and physiology.

Mayo. (International Journal of Surgery, February, 1902.)

Mayo. (Annals of Surgery, July, 1903.)

Mikulicz. (Grenzgebiete, ii, 251.)

Peham. (Deutsch. Zeits. f. Chir., 1898, Vol. xlviii, p. 484.)

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GASTRIC DILATATION AND TETANY.

BY JOHN H. CUNNINGHAM, JR., M.D.,
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THE following case, which has been periodically under the writer's observation for the past twenty-five months, is from the service of Dr. Francis S. Watson of the Boston City Hospital, and to this gentleman I am indebted for the privilege of reporting it. The comparative rarity of this disease, the high mortality under medical treatment, and the good results derived from the few cases treated surgically, make this case worth recording.

Male; single; twenty-eight years old; born in Boston; a collector by occupation. He entered the Boston City Hospital on the medical service of Dr. Charles F. Withington, March 11, 1902.

Family History.—Father died of heart disease. Mother with cancer of groin. One sister living and well.

Past History.—Measles, whooping-cough, and scarlet fever in childhood. Indefinite history of rheumatism. Denies any venereal disease. No history of hæmatemesis could be obtained.

Habits.—Moderate use of tea. Occasional beer and whiskey. No coffee. No tobacco for past ten years.

Present Illness.—Since 1896 the patient has had attacks of vomiting without known cause, which lasted one or two weeks. These occurred at intervals of weeks or months. During the attacks there was a constant dull, heavy, epigastric distress. For the first day or two of the attack he could eat a little toast and tea for breakfast without vomiting, but any ingestion of food later in the day or attack would cause him to vomit. During the attacks he was always obliged to give up work on account of weakness, epigastric distress, and a sense of general ill being, and spent most of the time in bed. During these periods it has been his custom to eat very little.

The loss of weight following the attacks has always been evident to the patient.

About six months after the beginning of the gastric disturbance the patient began to notice difficulty in distinguishing objects, both near and far. This gradually increased, so that three months later he was fitted with a pair of glasses by an optician. The glasses relieved this difficulty in great measure, but not entirely. During the attacks of vomiting it was with difficulty that he could distinguish the outline of objects, and later he could only distinguish light.

Between the attacks he could distinguish objects fairly well, and could read ordinary print. If, however, he left the glasses off, he immediately became nauseated and frequently vomited. This became so evident to him that he wore his glasses until getting into bed, when he placed them within reach and put them on immediately upon awakening in the morning.

During the interval between the attacks (usually four to eight weeks), he lived chiefly on soups, broths, and common proprietary predigested foods, and was able to do his duties as a collector.

On January 16, 1902, he began to have severe epigastric distress and belched more wind than previously, but passing wind by rectum was absent, as on all previous occasions. During the following two days he vomited everything ingested, which vomitus contained food eaten several days previously. Tingling of the hands, which he had noticed occasionally after vomiting, became more marked, and lasted about half an hour after each severe attack of vomiting.

On January 18, 1902, he was admitted to the Gouverneur Hospital of New York, where he remained fifteen days. He continued to vomit several times daily, and the vomitus occasionally contained "strings of blood." He was kept in bed and fed by mouth while in the hospital, and was discharged, being much relieved. Attempts at this time to pass a stomach-tube failed, and produced tingling in the hands and contractions of the fingers.

During the two months after his discharge from the Gouverneur Hospital, and previous to his entrance to the Boston City Hospital, the patient continued to vomit almost daily after the ingestion of food, which consisted, as before, of soups and broths. Tingling and numbness of the hands became pronounced.

The vomiting occurred about fifteen to thirty minutes after

eating. The vomitus was oftener larger in amount than the food ingested. It never contained blood, and was light colored and sour. He belched much sour, foul gas at all times.

He has been unable to work and has spent parts of each day in bed.

During the past two months the patient has lost thirty-five pounds by actual weight, and much in strength. He has been troubled with constipation for the past ten years, and previous to his first severe gastric disturbance had taken cathartics regularly.

There are no symptoms referable to the other systems.

Physical Examination.—A well-developed, poorly nourished man, pale and slightly anæmic. Not cachectic. Eyes: pupils equal, motions and reactions normal, four millimetres. Thick white coat on tongue. Breath foul. Throat slightly reddened. Neck normal. Pulse, equal, regular, fair volume and tension. Heart area; upper border, third rib. Right border, two and one-half centimetres to right, and left, ten centimetres to left of a median line. Apex impulse in fifth costal interspace. Action regular. Sounds clear. No murmurs. Lungs show good resonance respiration throughout without râles. Liver-dulness extends from the fifth rib to the costal margin. Edge not felt. Spleen area normal and organ not felt. Abdomen slightly retracted. Soft. Tympanitic. Moderate general tenderness. Contour of stomach could not be made out by percussion or auscultation. No tumors. Extremities normal without œdema. No enlarged lymph nodes. Knee-jerks, plantar reflexes, cremasteric and abdominal reflexes, equal and exaggerated. Temperature, 99° F.; pulse, 100.

Urine Examination.—High color. Sp. gr. 1032. Moderately acid. A slight trace of albumen. No bile or sugar. Urea, 2.2. Many hyaline and coarse granular casts.

During the examination the patient vomited thirty-two ounces of a sour-smelling, chocolate-colored fluid (color probably due to some chocolate drank just before admission to hospital). Vomitus contained no macroscopic blood and only an occasional blood-corpuscle microscopically. Total acidity, 0.48. Free HCl, 0.32. Lactic acid absent. Many sarcinæ and bacteria.

Immediately after the vomiting the patient had a typical

attack of tetany. The attack was equal on both sides. The thumbs were drawn in under the fingers, which were flexed at metacarpophalangeal joint, and very rigid. The wrists were flexed. The arms were flexed at the elbows and rotated inward so that they lay across the chest. The upper legs were in about one-half flexion and the lower legs in complete flexion upon the thighs. The flexions were strong, but both the upper and lower legs could be partially extended, the greater motion being in the hip-joint. The lips were firmly flexed, although not much drawn back, and the patient was unable to speak. The pupils were moderately contracted. The pulse rapid and high. The spasms lasted between two and three minutes, and were repeated several times at intervals of three to ten minutes, but were milder each time. Trousseau's symptom was present in both arms and to a less degree in the legs. Chvostek's symptom could not be satisfactorily demonstrated.

After the attack the patient complained of pain in the flexor tendons of both wrists, and said that he was conscious of what had taken place, but was confused in mind while the attack lasted. The hands remained numb for about half an hour.

A *test breakfast* three days after entrance showed a total acidity of .3 free HCl, 0.18. Lactic acid absent. No macroscopic and an occasional microscopic blood-corpuscle. Many sarcinæ and bacteria. The test breakfast was recovered by vomiting during an unsuccessful attempt to introduce the stomach-tube.

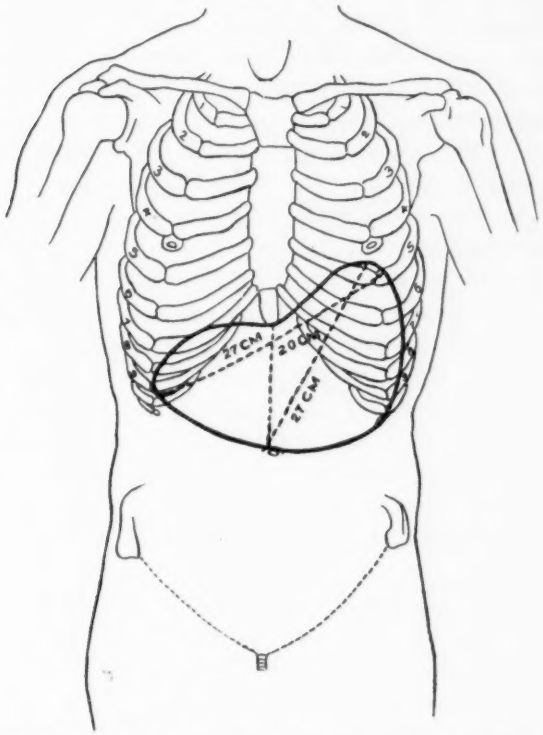
The patient was put on a liquid diet and always vomited within twenty minutes of ingestion. Between the ingestion of food he occasionally vomited an ounce or more of a viscid, whitish fluid not unlike mucus. He continued to belch wind, which together with the vomiting was little relieved by antifermentatives.

Five days after the first attack of tetany there was a milder attack following vomiting. The contractions were as previously noted, and lasted about two minutes, and the patient complained of numbness in the fingers, which lasted one-half hour, and during which time there was marked diminution in pain, temperature, and touch sense.

Two days later an unsuccessful attempt to pass a stomach-tube brought on an attack of tetany more severe than the previous and lasted eight minutes. The parts affected were as previously

noted. In this attack the toes were flexed onto the dorsum of the foot, and the tendons over the dorsum were prominent. The thighs could be extended at the hips with ease, but no passive motion could be produced in the knee-joint. The abdominal muscles were also very rigid. The knee-jerks, cremasterics, and abdominal reflexes were very lively throughout the attack. No

FIG. 1.



Percussion area after distention with tartaric acid and sodium bicarbonate before operation.

plantar reflex could be obtained, the toes remaining in strong flexion onto the dorsum of the foot. Passive motions and massage were very grateful to the patient.

The size of the stomach was determined by divided seidlitz powders with percussion. Areas as in diagram (Fig. 1).

Peristaltic waves were noted for the first time before and after the administration of the seidlitz powder. The waves ran

from the left to the right hypochondrium directly across the epigastrium.

Dr. Withington, feeling that the tetany was due to pyloric obstruction, had the patient seen by a surgeon, who advised operation, but as the patient had begun to take his food better he refused. Ten days after admission to the hospital the vomiting gradually diminished and the patient took nourishment better. He gradually improved in general condition as the vomiting and tetany ceased, and he was discharged, after being in the hospital twenty days, with the diagnosis of "gastric tetany dependent upon pyloric obstruction and gastric dilatation probably of a benign character."

After discharge from the hospital the patient continued to improve in general condition, but remained on a semisolid diet and took cathartics regularly.

After four months he started a lunch cart, which he was able to run, with occasional absences for two or three days on account of gastric distress and general debility. He had no further attacks of vomiting or tetany.

On March 2, 1903, nine months after discharge from the hospital, the patient, not having been seen for four days, was found in his lunch wagon, where he had been unconscious for this length of time. When found, he was having convulsions, and there was vomitus everywhere on the floor. He was unconscious, and was taken immediately to the City Hospital Relief Station.

The general physical examination at that time was as previously noted. He was subsequently transferred to the main hospital, where he was admitted to the medical service of Dr. E. W. Buckingham.

The patient states that he had been having gastric disturbance for several days and had occasionally vomited, following which he had twitching and numbness of fingers. The last he remembers was attempting to fill an oil-can, and when four days later he regained consciousness, he was in the hospital.

His vomiting subsided after transfer from the Relief Station, and he had no further attacks of tetany.

For aid in observing the case while on Dr. Buckingham's service, I am indebted to my friend, Dr. Fritz W. Gay, at that time House Physician to Dr. Buckingham's ward.

Test breakfast showed practically the same analysis as one year ago.

Blood Examination.—Leucocytes, 9000; reds, 4,900,000; hæmoglobin, 60 per cent.

The urine at this time gave evidence of more active renal disorder. It was pale. Sp. gr. 1011; strongly acid. Very slight trace of albumen. No bile. No sugar. Urea, 1.4. A few hyaline and fine granular casts with many small round cells adherent (renal). Many small round cells (renal). Small amount of fat, free and adherent to small round cells.

There were no symptoms subjective or objective referable to the renal condition. The temperature remained about normal, and the pulse was always below 100 and above 70, and of good volume and tension.

The patient remained in the hospital ten days, at the end of which time he was discharged, relieved of the immediate inconvenience, and again refusing operative interference.

On October 27, 1903, the writer was called to see the patient and found him in a severe attack of tetany. The contractions were more pronounced than in previous attacks. When lying on his side the knees were drawn up under the chin, the lower legs strongly flexed upon the thighs. The feet were flexed to their full extent. The face showed well-marked trismus and the angles of the mouth were considerably drawn out. The pupils were contracted and were about three millimetres. The muscles of the neck and back were not affected, but the abdominal muscles were very rigid. The arms, wrists, and fingers were in tetanic contractions as before noted.

The patient was semiconscious, understood what was said, but could not speak. Pulse, 126; poor volume and tension.

The attack lasted about one hour. It was learned that for the past week he had been vomiting after everything eaten, and had attacks of tetany several times daily, often lasting twenty minutes.

The patient was sent to the Boston City Hospital immediately, and was admitted to the surgical service of my former chief, Dr. Francis S. Watson, through whose courtesy I was able to follow the case.

The general physical examination was at first admission to the hospital, except that the patient's condition had failed con-

siderably. The outline of the stomach was visible in the epigastrium, and the greater curvature was visibly distinct at the level of the umbilicus without any dependent area of dulness or clapotage. Peristaltic waves were visible, running from left to right over the stomach area. These peristaltic waves could be made more evident by placing a cold hand over the epigastrium or flicking it with a towel wet in cold water.

Urine examinations as previously noted on Dr. Buckingham's service.

The patient complained of much pain in all the parts involved in the tetanic contractures for hours after they had ceased.

His condition began to improve twenty-four hours after admission to the hospital and the tetany and vomiting became less. Trousseau's symptoms could always be produced by a moderate degree of pressure over the brachial plexus and vessels several minutes after the contractures had subsided. Chvostek's symptom became evident about the mouth by a tap with the finger over the course of the facial nerve, and could be produced in a less degree in the extremities by taps over the respective motor nerves. The temperature, as on previous stays in the hospital, continued normal.

Operation two days later by Dr. Francis S. Watson.—After etherization a stomach-tube was passed for the first time, and the stomach thoroughly washed with normal salt solution, removing much dark, turbid fluid, and without producing tetany. All previous attempts to pass the stomach-tube had failed; the patient vomiting violently and immediately developing well-marked tetany, although on no occasion did the tube pass more than halfway to the stomach.

Through a median incision the stomach was found considerably enlarged; the walls thin and atonic, and the vessels much dilated. The right kidney was not abnormally situated or mobile.

The stomach surface was negative except at the pylorus, where palpation showed there was thickening and induration. The surface was smooth, without adhesions, and gave no visual evidence of a pathological condition other than thickening at the pylorus.

A posterior gastrojejunostomy was performed, observing the point urged by Mayo, viz., that of attaching a loop of jeju-

num to the most dependent portion of the greater curvature. The communicating openings were made at least three inches in length.

The incision was closed without drainage and united *per primam.*

Course of Case following Operation.—The patient was put on rectal feedings and received only warm water, in two-drachm doses by mouth for three days, after which time broths were given in increasing amounts and the rectal enemata were gradually omitted, so that on the fifth day following the operation the patient was on a liquid diet.

The wound healed by first intention and the stitches were removed on the tenth day.

The convalescence was uneventful, the temperature and pulse remaining normal at all times. The patient relished the liquid diet, which was gradually increased, so that twelve days after operation he was taking full hospital diet which included meat stews and potatoes.

From the time of operation on, he was free from all gastric symptoms, and relished full hospital diet, including steak, chops, and chicken.

He gained steadily in weight and strength. He was up on the twenty-first day after operation with a fitted abdominal swathe. Two days later he complained of pain in the left leg, and upon examination a phlebitis extending along the course of the long saphenous vein from the ankle to the groin was found. This subsided after two weeks' constant poulticing.

At the time of discharge from the hospital, seven weeks after operation, the patient expressed himself as being heavier and in better strength than he had been for fifteen years, but suffered the inconvenience of moderate swelling which persisted after the phlebitis.

The stomach area determined by percussion and auscultation at different times showed it to be much smaller than before operation.

Course of Case after Discharge from the Hospital.—Word occasionally received from the patient showed steady increase in weight and strength, with absolutely no return of gastric symptoms or signs of tetany. The bowels continued regular, one or two movements daily without the use of laxatives. The informa-

tion obtained in reference to diet showed that the patient was eating all sorts of food except pastry. The writer was, however, informed by his sister that the patient was very irregular about his meals, and ate everything, including corn beef and cabbage, mince and apple pie, and fruit in abundance. She also regretted that he chewed considerable tobacco and smoked much, but was pleased to note an entire change in the patient's disposition, which for years had been very disagreeable.

The swelling in the left leg following the phlebitis persisted, and the patient wore a silk rubber stocking during the day.

The patient was seen on January 6, 1904, nearly three months after operation, having gained twenty pounds in weight since his discharge from the hospital. His appearance was entirely changed, and there had been absolutely no gastric symptoms or signs of tetany. At this time he weighed 150 pounds. The patient stated that he was eating everything in large amounts and felt he could not get enough; his bowels were regular without laxatives, and he would be at work except for the swelling in the leg, which bothered him considerably, especially over the dorsum of the foot. He admitted eating pastry of all sorts and chewing tobacco, and said he smoked several pipefuls of tobacco daily and occasionally a cigar, but that he had used no liquor except a few glasses of beer.

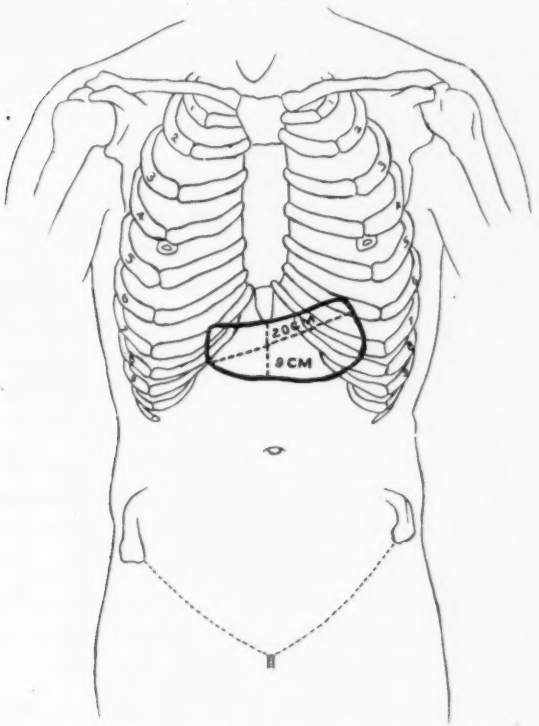
He expressed much gratification at the improvement in his eyesight, and said that he could distinguish objects and print now much easier without his glasses than he could before with them; and that he had not worn the glasses for many days without any of the gastric symptoms which used to follow when he left them off.

Divided seidlitz powders given at this time produced loud gurgling in the epigastrium and lower in the abdomen. The stomach area, percussed as quickly as possible, showed the area as in Fig. 2.

The patient expressed a sense of fulness in the epigastrium after the administration of the seidlitz powder, but this disappeared in less than three minutes. By comparison of Figs. 1 and 2, the relative size of the stomach before and after operation is certainly striking. The diminution in the size of the stomach, the gurgling and the quick disappearance of the sense of fulness, are good evidence that there is a large outlet between the stomach and the intestines.

Urine.—Color normal. Moderately acid, 1018. No albumen or sugar. Urea, 3.1. Sediment; occasional small round cells (renal)., Cryoscopy, 2.10.

FIG. 2.



Percussion area after distention with tartaric acid and sodium bicarbonate three months after operation.

The patient has since been seen several times, the last occasion being on March 9, 1904, which is five months after operation. On this date he weighed 172 pounds. He has been absolutely without gastric symptoms or suggestions of tetany, and says, "I was never so well in my life." He is irregular in his meals, which consist of everything, and he uses alcohol in moderation.

The size of the stomach at this time was practically as at the last examination, which is recorded in Fig. 2.

The *urine* is normal in all respects, and a cryoscopic freezing-point of 2.9, and an urea elimination of 3.8 shows a normal renal function.

The long period of time which the patient has been under observation and his high degree of intelligence have helped the writer considerably in recording the case.

Beside presenting the typical picture of long-standing gastric dilatation and stasis with subsequent tetany, there are special points of interest regarding the case. Aside from remarking that the duration of the disease and the severity of the tetany are one of if not the most severe in the literature, nothing further than that which has already been noted is to be said about the character of the tetanic seizures.

Leaving aside the primary mechanical cause of the obstruction, which was revealed at the operation, and considering the immediate cause of the tetanic seizures, it is interesting to note that the stomach-tube was at no time passed into the stomach until the patient was etherized for operation. This fact is interesting in reference to the reflex theory of Germain-Sée and Berlizheimer. Although the stomach-tube did not reach the stomach, its passage beyond the pharynx caused severe vomiting. The tetany following such attempts to pass the tube was unquestionably reflex, and the spasms were due to reflex action through the nerves of the pharynx and œsophagus or, possibly, from the stimulation produced by the vomiting as a sequence to the unsuccessful attempts to pass the tube.

The examinations of the *stomach contents* at various times during the twenty months that the patient was under observation before operation show it to be light colored, always acid,—without macroscopic blood and only an occasional microscopic corpuscle,—sarcinæ and bacteria were usually numerous even with the acid reaction. The total acidity was never much increased over normal, which is also true of the free hydrochloric acid. Lactic acid was invariably absent.

By comparison of Figs. 1 and 2, showing the size of the stomach before and after operation, it is interesting to note the diminution in the size of the organ. It previously measured twenty centimetres in the median line and twenty-seven centimetres in its longest diameters; while following the operation its median dimension was nine centimetres and its longest axis twenty centimetres.

The *urine* examined during the attacks of vomiting and tetany showed marked concentration, which is in keeping with the observations of others. The color was always dark, the specific gravity high, moderately acid, and albumen was always present in small amounts. There was no bile or sugar at any time. The urea was diminished and hyaline and granulated casts were always present, and sometimes associated blood, renal epithelium, and fat. There was no difficulty in micturition, as described by some, and attributed to spasm of the bladder sphincter. Between the periods of vomiting and tetany, and after discharge from the hospital, the urine was passed in normal amounts, of normal specific gravity and color, less acid, and with only the slightest possible trace of albumen. The urea remained slightly diminished, and only an occasional hyaline or granular cast was to be found in the centrifugalized urine. Since operation the amount has remained practically normal, the albumen disappearing entirely, and rarely a hyaline cast can be found. The urea is eliminated in normal amounts, and the cryoscope freezing-point shows the kidneys to be secreting the normal amount of solids.

The interpretation placed upon the urine during the attacks of vomiting and tetany must be in favor of the supposition that some toxine is acting upon the kidney structure during the process of its elimination.

The *blood* examination while at the hospital showed a moderate secondary anæmia and slight leucocytosis, which, since discharge after operation, has entirely disappeared. It is to be regretted that cryoscopy of the blood, together with the urine, could not have been done during the attacks of tetany, and one is unable to remark upon Küssmaul's theory of concentration of the blood in this disease as the immediate cause of the tetany.

The *eyes* are of considerable interest, becoming affected early in the gastric disturbance (in 1896), causing him much inconvenience, and being a constant stimulus in producing vomiting and tetany whenever he attempted to go without his

glasses. Their improvement since operation is certainly remarkable.

The pupils during the attack were contracted, which is in accord with the observations of Bouveret and Devic, and contrary to those of Tresilian and Küssmaul.

It is unfortunate that no ophthalmological report of the eyes at an early stage is to be had. An examination by Dr. Myles Standish, of the Harvard Medical School, on January 14, 1904, is as follows:

Ophthalmological Examination O. U. V. = 20/100.
O. D. V. = 20/100 with +2.00+.50 ax. 90° v = 20/20.
O. S. V. = 20/100 with +2.00+.50 ax. 90° v = 20/20.
Near vision = Snellen type, 1.25 D.
Esophonia, 11°.

" In short, his ocular conditions are such that he maintains binocular single vision only with the greatest difficulty, and any disturbance which upsets his nervous balance would be likely to produce the symptoms of which he complained."

It is evident from Dr. Standish's examination that there are certain abnormal conditions of the eyes which have always existed independent of his gastric condition.

The patient's belief that his eyes are so much better is partially true, and is dependent upon his improvement in general health; the mechanical abnormalities of the eyes, however, still remaining.

The *motor aphasia* during the attacks and the comparatively slight involvement of the sensory speech area are certainly worthy of note.

The feebleness and rapidity of the *pulse* which has been noted during the tetanic spasms are confirmatory of the observations of others, and is explained by Dickson as being due to spasmodic contractions of the blood-vessels themselves.

The *temperature* remained about normal, but was more frequently below this point than above.

The *reflexes* were always normal in character but considerably exaggerated, and during the attacks those which were not involved to the degree of spasticity showed marked increase.

The reflexes three months after operation were all slightly exaggerated, but less so than at any time since the patient has been under observation.

Symptoms.—The symptom, tetany dependent upon gastric dilatation, and known as gastric tetany, is to be differentiated from the tetanic spasms occurring in gastro-enteritis, pregnancy, thyroidectomy, the puerperal state, acute fevers, and the carpopedal spasms associated with rickets; also from those produced from toxine substances, as in lead and morphine poisoning, etc.; and from the diseases of the nervous system, such as epilepsy, hysteria, and the definite lesions of the spinal cord, *e.g.*, syringomyelia. The epidemic form described by Frankl-Hochwart is apart from the subject, and is not to be considered.

Gastric tetany dependent upon dilatation of the stomach was recorded by Küssmaul only as far back as 1869. The tetany of gastric dilatation is usually dependent upon pyloric stenosis, subsequent dilatation and hypertrophy of the organ, and associated stasis and hyperchlorhydria. The pyloric obstruction is usually benign, due to cicatrization of a gastro-ulcer, and gives rise to a series of tetanic contractions which are fairly characteristic The obstruction may be malignant, as in the cases of Trevelyan, Bouveret, and others, or may be dependent upon pressure from other organs.

The attack of tetany most commonly follows severe vomiting, or less frequently after emptying and lavage of the stomach.

Usually the first symptom is pricking and numbness in the hands. This early symptom, as a rule, is of so little inconvenience to the patient that it is frequently overlooked unless the surgeon puts the question direct. Later in the disease there may be an aura of fatigue, and the attack is usually preceded by severe vomiting.

Tetanic contractions appear in the hands; the fingers being flexed at the metacarpophalangeal joint, and the outer phalanx usually extended. The thumb is adducted into the palm of the hand. The wrists are either strongly flexed or less frequently

extended. The lower arm is flexed at the elbow and rotated across the chest. The legs are flexed at the hips and knees; the ankles and toes flexed or extended. The face occasionally shows trismus, with the corners of the mouth considerably drawn out. Transitory blindness has been recorded by Küssmaul and Bouveret. The patient may remain conscious and quiet, motor speech being involved, or delirious with absence of sensory speech. The muscles of the neck, chest, back, and abdomen are less commonly involved. The limbs are sometimes tense and œdematous and the patient may be cyanotic.

The attacks last for a few minutes, occasionally or frequently repeated, or may even continue for days and weeks. These prolonged cases are almost invariably fatal.

The groups of muscles usually involved are in the order above stated.

Certain symptoms—Trousseau's, Chvostek's, Erb's, Hoffmann's—are usually present.

Trousseau's Symptom.—As the attack subsides, pressure over the principal nerve-trunk or blood-vessels, enough to impede the venous or arterial circulation, will reproduce the paroxysm.

Chvostek's Symptom.—A slight tap over the principal nerve, for example, the facial, will throw its muscles of distribution into spastic contractions, giving evidence of the increase of the mechanical excitability of the motor nerves.

Erb's Symptom.—A faradaic current applied over nerves and muscles shows great increase of electrical irritation.

Hoffmann's Symptom.—Slight pressure over the sensory nerves gives evidence of their increased excitability as shown by parasthesia in the region of their distribution.

After the attack has passed off, great pain is experienced in the parts involved, and massage and passive motions are very grateful to the patient.

Tresilian reports a case in which blindness lasted for three days, associated with aphasia for one day. Küssmaul records a similar case. These men record the pupils as widely dilated and

not reacting to light during the attack, while Bouveret and Devic record the pupils as usually contracted.

Etiology.—Küssmaul, Germain-Sée, Berlizheimer and others, Bouveret and Devic, have presented the most probable theories, based upon experiments, to explain the cause of gastric tetany.

Küssmaul's Theory.—This theory considers the loss of fluid from the tissues of the body to be produced by increased secretion of the gastric mucosa, frequent vomiting, and the inability of the tissues to regain sufficient fluid by absorption from the gastro-enteric tract. To support this theory he parallels the contractures in cholera, which he considers also due to concentration of the blood by loss of its fluid in the stools, but now known to be due to the toxines absorbed from the intestinal canal. Without explanation, he believes that the inspissated blood affects the motor centres of the nervous system.

Fleiner and Jürgensen state that there is diminution in the amount of the blood serum, and, therefore, a fall of blood-pressure is probable. Other investigators have failed to find diminution in the amount of the blood serum. This theory, *per se,* has few adherents, but very likely remains as a casual factor.

Germain-Sée, Berlizheimer.—These men, together with Müller, Collier, and others, have explained the tetanic spasms as being reflex action produced by stimulation of the sensory nerves of the stomach. Certain facts are given in proof of this theory, namely, the usual onset of the tetany following an attack of vomiting or passage of the stomach-tube. Albu states that the stimulation of the sensory nerves of the stomach is not the underlying factor, but only the momentary cause of the spasm. As an analogy he cites strychnine poison in the frog and tetanus in man, in which conditions convulsions are produced by irritation of the nerve ending in an already existing pathological condition.

Bouveret's and Devic's Theory.—This theory is dependent upon the belief of auto-intoxication due to prolonged and ab-

normal chemical processes of digestion in certain cases of gastric retention and hypersecretion.

Bouveret and Devic, in three cases of tetany with gastric dilatation, isolated a substance, soluble in alcohol, from the stomach contents which was closely allied to syntonin, and identical with the peptotoxine of Brieger. This substance when injected into the circulation of animals produced general convulsions. Frankl-Hochwart, however, state that these cases were never proven to be gastric tetany, as the symptoms of Trousseau, Chvostek, and Erb were all absent.

Following this experiment, Albu, Gumprecht, Landsteiner, Blazicek, Berlizheimer, Von Jaksch, and Dickson failed to produce tetanic convulsions by injecting untreated gastric contents into animals.

Bouveret and Devic admit that a new substance is produced in the extraction of the toxine by alcohol which does not pre-exist in the gastric contents.

Elaborate chemical experiments by Halliburton and McKendrick further complicate this theory and make it so speculative that it cannot readily be accepted. The employment of alcohol by Bouveret and Devic may in itself have been the cause of the convulsions produced.

Dickson, in experiments by subcutaneous injections into rabbits and guinea-pigs with the following solutions of untreated stomach contents, removed from a patient three days after the onset of the tetany, failed to give any evidence of convulsions or paralysis.

1. Filtrate of unaltered stomach contents.

2. Filtrate of stomach contents evaporated to dryness, *in vacuo,* over strong sulphuric acid at a temperature of 40° C. and extracted with normal saline solution.

3. Filtrate of stomach contents evaporated as in No. 2; extracted with alcohol, again evaporated to dryness, and then extracted with normal saline solution.

Hyperchlorhydria and sarcinæ have been present in the great majority of all cases reported. None of these, however, can alone justly be considered as the etiological factor.

No one of the three theories presented can be considered as embodying the true cause of the contractions; and it may even be doubted if the three together cover all the etiological elements involved in this disease.

The third theory, that of auto-intoxication, is, however, most in keeping with the known conditions in other diseases, and is the one usually accepted.

Albuminuria has been an almost constant symptom in the reported cases of gastric tetany, although post-morten findings have failed to give evidence of renal disorder. The albuminuria is probably due to the elimination of concentrated toxic elements, and cannot in any way be considered an etiological factor, as renal symptoms have been consistently absent. Diminution in the amount of urine has been almost constant, and has been invariably concentrated with evidences of lessened metabolism.

Local Conditions.—Post-mortem and operative examinations show ulcers in various stages of cicatrization, most commonly in the duodenum as reported by Bamberger, Renbers, Dujardin-Beaumetz, and others. Less frequently both in the duodenum and stomach as reported by Moynihan, Loeb, and Neumann. The reported cases of Trevelyan, Bouveret, Devic, and Riegal show malignant disease of the pylorus to be a fairly common factor in producing gastric dilatation and subsequent tetany. The pyloric obstruction is occasionally produced by pressure from growths in or abnormal positions of, certain organs in the abdomen, for example, the right kidney.

Blazicek records a case in which the dilatation was dependent upon a large gall-stone. Berlizheimer's case showed the obstruction to be due to pressure from a pancreatic cyst upon the duodenum. A case of hour-glass stomach producing gastric tetany is reported by Müller.

Prognosis.—Statistics by various authorities show that the prognosis is very grave. The mortality is high, and recovery without operation is comparatively rare.

The fatality of the recorded cases is startling. Series of cases by different authorities are as follows: Frankl-Hochwart,

eleven cases, ten died; Bouveret and Devic, twenty-three cases, eighteen deaths; Albu, forty cases, thirty-one died; Riegal, twenty-seven cases, sixteen deaths. The mortality figured from these cases and as stated by other authorities is between 70 and 80 per cent., and nearer the latter than the former.

The etiology of the obstruction, although the primary cause, plays a minor part in the gravity of the prognosis; the real pernicious factor probably being that unknown factor which is the immediate cause of the tetany.

It is the rule that death occurs sometime after the tetanic seizures have become well developed by failure of the patient to respond to treatment. However, Marten and Trevelyan each report a case which proved fatal within a few hours of the first attack.

Besides the serious danger of the patient's dying during the actual attack of tetany, there is always the probability of its recurrence and certainty of ultimate death.

Treatment.—Until recent years the treatment of gastric tetany has been entirely medical, and as yet the number of cases treated surgically is perhaps too small to admit of just comparison. However, the relatively large number of cases treated medically show a mortality in the vicinity of 80 per cent., while, so far as the writer can find from a careful search of the literature, the surgical cases show a mortality of 37.5 per cent.

The medical treatment is directed towards emptying the stomach of its residuum and keeping it so; thereby eliminating whatever toxic substances may enter the circulation or cause the tetany from this source; and also to thus improve the tone of the stomach and the motor insufficiency.

At the onset of an attack of gastric tetany the organ should be emptied by an emetic or, if possible, the stomach-tube. Even after the vomiting which frequently precedes the attack considerable putrefying material will still remain in the stomach. Trousseau found that ice applied over the spine was beneficial in some cases. Others advocate placing the patient in a tepid bath just as soon as the spasms begin, and, if the case is not chronic, to continue the baths three or four times daily, at a temperature

of 30° C. Sedatives, usually the bromides, and also morphine, are to be administered during the attack; and if the paroxysms occur frequently, sedatives are to be continued with regularity. It is a question, however, if any drug diminishes the violence or frequency of the spasms. It may be found an advantage to keep the patient on rectal feedings as long as the vomiting persists, and lavage should be carried on in those cases in which it is possible.

Between the attacks thorough lavage is to be practised often enough to remove the stomach's residuum and to prevent putrefaction. A small, easily digested diet should be given and strict attention must be paid to keeping the bowels open. Also the general health and hygienic surroundings of the patient must receive careful attention.

Various solutions have been advocated as the medium with which to cleanse the stomach; chiefly mild antiseptics. That adopted by Professor Greenfield is, perhaps, the best known. By means of the stomach-tube he empties the organ and cleanses it thoroughly with a solution of sodium phosphate, two drachms to the pint, boric acid, or Condy's fluid. He then leaves in the stomach a solution of sodium phosphate, two drachms to the pint of hot milk.

Medical treatment undoubtedly does much to aid the patient through the immediate attack. How much it improves the tone of the stomach, lessening the motor insufficiency and overcoming the stasis, is questionable; and it is certainly true that the underlying factor, the mechanical obstruction, which causes the dilatation, cannot be overcome in this way and still remain.

Even relieved of the symptoms the patient is still an invalid, with the chances of an early recurrence and unfavorable prognosis regarding life constantly before him.

In view of the improvement in the technique of gastric surgery, the brilliant results obtained in the last cases in the small series which have been operated should necessarily make surgical procedures in this disease more common in the future than in the past. With the exception of Mayo Robson's cases, in which the duration and severity of the tetany is not minutely

recorded, but may have been present for some time, all the patients were in the *extremis* of the disease.

In all the cases operated upon, gastric dilatation with obstruction of the pylorus dependent upon some definite lesion was found. Although the writer, with others, believes that practically all cases of gastric dilatation, motor insufficiency, and stasis unrelieved by medical treatment should be operated upon, one must insist that those cases which develop tetany as a sequence should be operated upon immediately following the onset of such symptoms. The mortality of about 80 per cent. in the cases of tetany treated medically show that the disease is a very serious one.

Whatever may be the especial cause or effect upon the general system by the symptom, gastric tetany, is speculative; yet it is certainly severe and much more serious than gastric dilatation alone, from whatever cause. The primary underlying factor is pyloric obstruction; the inability of the patient to hold the proper amount of nutrition in the stomach; or, if able to retain the sufficient nutrition, the inability through motor insufficiency to force it into the intestines because of the small lumen of the pylorus.

The pyloric obstruction, if sufficient to cause dilatation, motor insufficiency, and stasis, and to produce gastric tetany, is too serious a condition to be overcome by medical treatment, and operative interference is necessary to establish a sufficient outlet of the stomach into the intestines.

Gastro-enterostomy, pylorectomy, and pyloroplasty are indicated. In view of the statistics of Robson, Mayo, and Munro, regarding these operations in benign cases, the procedures in themselves are shown to be accompanied by a surprisingly small mortality.

One hundred and one gastro-enterostomies by Mayo Robson show a mortality of 3.9 per cent. and twenty cases of pyloroplasty, twenty recoveries. To quote from Mr. Robson regarding the mortality of his cases of gastro-enterostomy: "Death was due to the extremely low vitality at the time of operation."

In 168 cases of gastro-enterostomy performed by Mayo, 157 recovered and eleven died, a mortality of 6.5 per cent.

Munro, of Boston, in personal conversation, stated his recent figures of gastro-enterostomy as twenty-five recoveries and two deaths, both deaths being due to disease foreign to the operation. These figures show that the operation in itself is not to be feared, and it is a general surgical belief that, if the cases could be subjected to operative treatment before the patient is practically starved to death by lack of intestinal absorption, the mortality would be even lower.

The surgical cases are so few in number and so concisely recorded that the salient points of each case are given below.

CASE I.—Mayo Robson.—Man; thirty-four years old; suffering five years with epigastric peristalsis giving the ordinary picture of pyloric obstruction. For some time before the operation he had "cramps" in his limbs, especially the legs. While in the hospital, just before operation, he had a severe attack of tetanic spasm described as follows: "affecting almost all the muscles of the body." "So extreme were these and so widespread, the muscles of the trunk and of the cervical region, as well as those of the limbs being affected, that the question of poisoning by strychnine was raised."

Operation seven days later; pyloroplasty. "The obstruction was found to be cicatricial stenosis with hypertrophy of the pylorus." The convalescence was uneventful. Mr. Robson states that in a letter from the patient four years later, he expressed himself as a "new man," and had been without recurrence of the "cramps."

CASE II.—Man; twenty-four years old. Mr. Robson records the gastric condition and the symptoms of tetany as follows: The patient had "severe painful cramps of the extremities and abdomen with persistent vomiting." "He gave a history of having had pain after food for several years previously and to have vomited blood, since which time he had never been well and had gradually lost flesh." "For some little time before I saw him he had vomited every day unless the stomach was washed out."

Operation.—Pyloroplasty. "The pyloric orifice would only permit the passage of a No. 10 catheter." Diagnosis. "Simple stricture of the pylorus." The recovery was uninterrupted. Mr. Robson states that a letter received from the patient one year later stated that he had had no further trouble with his stomach.

CASE III.—Mayo Robson.—Woman; twenty-nine years old. This patient had suffered severe abdominal pain associated with vomiting and loss of weight for seven years. At the end of six years operation was advised and refused. No record of tetany appears up to this time. One year later the patient returned, and Mr. Robson's record at that time is

quoted as follows: "The pain in the abdomen was excruciating and occurred every day." "She said it was associated with severe cramps in the legs and thighs, and at night she was kept awake by the pain." "Vomiting of large quantities occurred daily and she was steadily losing weight and strength."

Operation.—"Active ulceration of the pylorus, which was adherent to the gall-bladder, liver, and abdomen walls, and was so much thickened as to form a distinct tumor." "Pyloroplasty was performed after the adhesions had been separated." "Recovery was uneventful." A report sent to Mr. Robson a little over three months after operation stated that "she had gained flesh and was well."

Seven months after operation the patient began to have stomach symptoms, but with little loss of flesh. The record shows that, beginning two years after operation, "the vomiting and loss of flesh and well-marked stomach splash showed that the pyloric trouble had recurred, and, as I found a distinct tumor of the pylorus which I believed to be simple inflammatory induration, I performed a gastro-enterostomy."

A letter one year later states that the patient was well and had regained her weight. There were no returns of the painful cramps from the time of the first operation.

CASE IV.—Fleiner.—Lacks details of conditions found at time of operation, which was a gastro-enterostomy. The patient showed no untoward symptoms for the first four hours, then became restless, and two hours later died with symptoms of collapse. The autopsy showed round-cell sarcoma of the pylorus, excessive dilatation of the stomach, and extensive degeneration of the parenchyma of the heart, the kidneys, and the liver. The gastro-enterostomy wound and the local operative conditions showed nothing that would have entered as a factor in the fatal result.

CASE V.—Fleiner.—Operated in the Clinic of Czerny of Heidelberg. On this case a pyloroplasty was done. The condition found at the time of operation was a benign constriction of the pylorus and dilated stomach. The pyloric stenosis was referable to a foregoing duodenal ulcer, which had healed, and from which there had resulted numerous adhesions between the pyloric region, the liver, and the gall-bladder, while between the appendix and the gall-bladder there was a separate set of adhesions which had probably resulted from appendicitis of many years before. The adhesions about the pyloric end of the stomach were divided and pyloroplasty was performed.

The patient died ten days later. Autopsy showed: Pneumonia; pleurisy; purulent peritonitis over the cardiac end of the stomach, and acute parenchymatous nephritis.

CASE VI.—Gumprecht.—In this case the duration of the tetany was of long standing.

Operation.—Pyloric resection. The pylorus was broadened and thickened, and gave evidence of stenosis from an old ulcer. The lumen would

admit a lead-pencil, but the finger could not be introduced into it. The patient died in five days of general peritonitis.

CASE VII.—This case, which has been beautifully reported by W. C. Carnegie Dickson and later operated upon by Mr. Caird, is one of the most brilliant of the recorded cases.

Man; forty-seven years old. Gastric disturbance for sixteen or seventeen years, during the latter part of which time he had had four or five attacks of tetany. The stomach was much enlarged, and had a considerable residual of old putrefying food. The attacks of tetany and observations while in the hospital are recorded with great care and minuteness, and the reader is referred to Mr. Dickson's own descriptions for details.

The patient was at times *in extremis*. He, however, gradually improved, and left the hospital three months later, relieved of his vomiting and tetany.

After three months his gastric symptoms began to return and he lost considerable weight. He returned to the hospital and Mr. Caird did a gastrojejunostomy. "The pylorus was found to be greatly narrowed and somewhat thickened and hypertrophied, and at its upper and posterior part there were firm, puckered, cicatrical adhesions to the surface of the gastrohepatic omentum, while similar old peritonitic bands were also found between the lower and anterior aspects of the pylorus and the adjacent surfaces of the great omentum."

The recovery was uninterrupted, and at the time of Mr. Dickson's article in 1901, several months after the operation, the patient was perfectly well, eating and doing everything and enjoying life in every way.

Analysis of the Operated Cases.—Without going into details, this series of eight operated cases shows three deaths, two of which were due to complications incident to any abdominal operation, and the third, collapse, attributed to the very low vitality of the patient at the time of operation.

In conclusion, the writer wishes to express his appreciation of the courtesies extended by Drs. C. F. Withington and E. W. Buckingham by placing the records of the case, while on their services, at his disposal.

The history of this case while on Dr. Withington's service has been recorded, with other forms of tetany, in a paper by Dr. Lawrence W. Strong.

A complete bibliography is not given in detail, as many of the references recorded include the remaining articles upon the subject of gastric tetany.

The most complete bibliographies are to be found under

the references of the following men: Risien Russell, Trevelyan, Souttar McKendrick, and Halliburton and McKendrick.

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SPONTANEOUS GANGRENE OF THE HOLLOW VISCERA.[1]

A STUDY OF MESENTERIC OCCLUSION.

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WHAT I have to say regarding the appearance of spontaneous gangrene of wide extent within the abdominal cavity, and involving especially the hollow viscera, may perhaps be illustrated by a brief report of two exceedingly instructive cases.

In April of 1902 I went to Ithaca for the purpose of keeping an operative engagement, the patient being ready in the hospital at the time. Immediately on my arrival, I was asked by Dr. Meany to see with him a patient who had been brought in early the same morning. He proved to be a mail-carrier, of about forty-five years, without antecedent history, who had worked until the afternoon of the previous day, and had then been taken suddenly sick with severe abdominal pain, so that he had to abandon his work. I mention his occupation to indicate that he had been apparently in excellent health up to the moment of his seizure. When brought to the hospital, some three hours before I saw him, he was almost collapsed, with a rigid abdomen, very much distended, vomiting frequently a material which was almost fæcal, and which had a coffee-ground appearance; his pain, which had been agonizing, had subsided. Physical examination revealed nothing except meteorism. Abdominal section was advised, and performed some three hours later.

While taking the ether his heart apparently stopped, and he was revived with difficulty, and apparently only by means of intravenous saline infusion. Incision in the middle line gave

[1] Read at Boston, January 20, 1904, before the Middlesex South District Medical Society.

escape to a quantity of most offensive blood-stained serous fluid, after which he again collapsed and almost died upon the table. I was able to explore sufficiently, however, to determine that the entire small intestine from stomach to cæcum was gangrenous, and in places almost ready to slough; that the large intestine seemed involved in the same process, but to perhaps less extent; that every portion of the peritoneal cavity was infected, and that the parietal peritoneum seemed almost as much involved as the visceral layer. The interior of the abdomen presented a perfectly cadaveric appearance, while the odor was even more offensive.

The abdomen was closed, and the patient removed alive from the table, but died two or three hours later.

Another case of same general character was that of a young married woman, thirty-three years of age, who late in the afternoon of November 29, 1902, was taken acutely sick with pain in the upper part of the abdomen and with vomiting; the pain was excruciating, and with difficulty relieved by morphine; the vomiting continued. The following day she was sent to the Memorial Hospital, Niagara Falls, New York, where I saw her, with Drs. Campbell and Chapin, early in the evening. At this time, less than thirty hours after the onset of the trouble, she was exquisitely tender, vomiting greenish mucus with a distinct fæcal odor. The abdomen was very much distended, and there had been no passage of fæces nor even of gas; the abdominal muscles were rigid; her pulse was rapid, her pain had subsided, her tongue was not furred, and she was able not only to chat, but to be humorous in her remarks.

As the case had been described to me over the telephone, I was quite ready to find it to be one of acute pancreatitis, but after examination I abandoned this idea.

The operation was performed at the Memorial Hospital the same evening. Incision was made in the middle line below the umbilicus; the outer tissues were already œdematous and the subperitoneal fat was necrotic; the peritoneum was black. On opening it foul-smelling fluid escaped; on lifting up the omentum every loop of intestine that could be exposed or brought into view was gangrenous, and appeared almost ready to tear; the posterior surface of the omentum was almost black and gangrenous. Everywhere, so far as I could explore, the same condition ob-

tained, and the large intestine seemed involved as well as the small.

This patient surprised me in that she lived longer than I would have supposed possible. For about forty-eight hours she was comfortable, chatted, and seemed to feel quite encouraged; then she was seized again with intense pain, which did not yield to morphine, and which could only be allayed by inhalations of chloroform. She died some nine hours later.

In neither of these cases was autopsy allowed; the nature of the lesion must then be, to some theoretical extent, conjectural. It will readily be understood how difficult it would have been in either of them to arrive at a perfect solution of the problem, owing to the fact that the parts involved were already in a putrefactive condition some time before the death of the individuals.

The two cases which I have briefly rehearsed are perhaps the most pronounced of their type of any that I have encountered in literature, and deserve to be put on record. They may serve also as a general introduction to the subject, which probably has not yet been exhausted. (*Vide* also Elliot, ANNALS OF SURGERY, January, 1895.)

Mesenteric occlusion was first described by Virchow in 1859, and by Küssmaul and Gerhardt in 1863. Occurring in the mesenteric circulation, the condition is harder to explain than in many other places. It must, however, be remembered that while the veins of the mesentery have no valves, the arteries like those in the brain are terminal, and collateral circulation is therefore not prompt nor complete. After tying the superior mesenteric artery the blood supply of the intestine is at once shut off. Faber believes that the very weight of the blood contained in the portal circulation may so obstruct the arterial supply as to lead to the formation of infarcts. Bier maintains that after obstruction a collateral circulation is not re-established because the intestine lacks that "Blutgefühl" upon which he lays so much stress, and because it seems to be under no complete vascular control.

The influence of the hæmorrhagic diathesis and the association of hæmorrhages in other parts of the body, especially in the submucous tissues, have been noticed in not a few cases. This has been considered to be an expression of a toxæmic condition, due perhaps to a lack of hydrochloric acid in the stomach, although it may include any one of the various toxines in the blood. Whether the first change which leads up to this result occurs in the blood or in the blood-vessels is still an open question. It will be remembered that Henoch described a form of purpura characterized by hæmorrhages into the joints as well as by bloody vomit and stools. It is of interest to note here, also, that one of the explanations given to purpura is that it is due to multiple emboli in the small vessels of the skin.

According to Gallavardin, the most frequent cause of mesenteric embolism is mitral stenosis; the next most frequent cause is probably arterial sclerosis. Falk collected seventeen cases of embolism of the intestinal arteries; in every one of these there was evidence of embolic disturbance elsewhere, which constitutes an important point in diagnosis. The possible simultaneous occurrence of embolism and thrombosis should not be overlooked. Sprengel has described a form of dry anæmic gangrene of the intestine, which, however, appears to involve relatively small areas instead of producing extensive destruction.

Thrombosis is nearly always an extension of a primary lesion beginning in the veins of the pelvis, kidney, or intestine. It is common after acute appendicitis, acute metrophlebitis, pyelophlebitis, intestinal ulceration, etc. Curiously, it is rare after that most extensive form of the latter with which we have to deal in typhoid fever. The veins are often affected in these cases, but much more often those of the lower extremities than those of the intestine. And here, by the way, I might add, we notice peculiarities varying apparently with different years; for instance, during the past summer and fall I saw more cases of crural phlebitis than in many previous years together. In the thrombosis which follows infection of the hæmorrhoidal

veins the type of the disease is usually pyæmic, and the most prominent lesions are in or around the liver.

In the mesenteric veins there occurs a form of endophlebitis corresponding very closely to the endarteritis which produces arteriosclerosis, and which is scarcely ever met with elsewhere in the body. Nowhere else, save in the brain, are we likely to meet with multiple aneurisms and the trouble which they may set up.

Presumably the trouble occurs in the arteries more often than in the veins, and consequently an arterial lesion may appear as (*a*) infarct, (*b*) gangrene, (*c*) abscess.

Here, too, embolism may have different results than those which follow it elsewhere about the body; for example, in the brain it usually produces necrosis, as it does also in the extremities; whereas in the lungs it produces infarct; the result depending largely on the size of the vessels, the richness of the anastomosis, and the blood-pressure. In the mesentery so many factors figure that there must necessarily be many discrepancies between theory and fact. Cohnheim experimented by tying the artery and vein together; he also tied the artery alone, but found the results were practically identical. The readiness with which intestinal tissue breaks down when its blood supply is cut off has been especially demonstrated by Grawitz, who has shown how easily the necrosing intestinal walls become permeable for bacteria. Litten also experimented extensively with animals, and called attention to the remarkable depression of the pulse, complete loss of appetite, frequent vomiting of blood with bloody stools, and the meteorism, which follow the application of ligatures to these vessels.

Tangle and Harley, as well as Kalisch, have found that glycosuria often follows experimental ligation, especially when the ligature is placed upon the upper mesenteric artery. Meteorism, which is so pronounced a feature of these cases, is explained by Kader as due to the complete paralysis which follows such acute gastro- and enteromalacia. All the experiments of the different investigators tend to show that obstruction to the circulation of the mesenteric artery is quickly fol-

lowed by necrosis and infarct. Why the cœliac branches of the gastrohepatic, pancreaticoduodenal, gastroduodenal, and the gastro-epiploic do not better bear the burden thus imposed upon them, it is hard to understand. Cohnheim believed that the vessels of the intestines, like those of the kidney, have very little power of resistance, and on the contrary break down very easily and rapidly. As already remarked, the intestinal veins have no valves, and therefore carry, unassisted, the pressure of the portal system.

While what I have said pertains largely to shutting off the blood supply of the entire intestinal tract, there are numerous recorded cases which show also that we may have involvement of some of the mesenteric branches rather than of the principal trunk, so that in some cases we get an annular necrosis of greater or less extent. When one in operating sees the intestine bleed as readily and freely as it usually does, he often fails to appreciate the fact that, in spite of the great vascularity of the parts, the anastomotic paths are long.

Several cases are on record of mesenteric occlusion following thrombosis in the pulmonary veins. Again embolism may be, and in fact must be, followed by a thrombosis in the occluded artery, as well as later in the accompanying vein. Trouble of this kind is relatively much more frequent among some of the lower animals, especially the horse, and occurring in these animals is usually due to the presence of strongylus in the intestinal vessels. Here it produces an endarteritis; this leads to the formation of the so-called "aneurisma verminosum," whence may proceed numerous emboli.

So soon as one of these vessels has become plugged there ensues a prompt contraction or anæmia of the gut; then follow venous stasis and loss of contractility. This may be evidenced by dilatation, so that at this time the appearance of the compromised intestine may vary from well-marked anæmia to positive gangrene. Such cases as those with which I began this paper indicate a process involving both the superior and inferior mesenteric vessels. The extent of the necrosis may also vary from a slight annular gangrene to such total gangrene

as that which I first described; even the colon, sigmoid, and rectum may suffer in some of these cases, while Harrington and others have described gangrene of the rectum, even including the anus and the sphincter, apparently resulting from similar lesions. (*Boston Medical and Surgical Journal,* loc. cit.)

My own cases were characterized by a large amount of fluid and bloody exudate, by gangrene of the parietal peritoneum, and by œdema of the subserous tissues, showing an intensity and extent of damage far beyond that with which I had become familiar in my reading, and which seemed to me remarkable.

The intestinal contents in these cases are frequently bloody, sometimes almost pure blood. It is stated that sometimes the lymph nodes do not seem to be implicated, the process having been apparently too rapid. Obviously, peritonitis will always complicate such a case, while the patient apparently dies of very acute toxæmia.

Mesenteric thrombosis by itself has been carefully written up, among others, by Pilliet (*Progres Médicale,* 1890), who thinks that not every case is fatal; in other words, that cases occur and are followed by recovery, and that it is often an ascending process. Mesenteric thrombosis is known to have followed amputation of the lower extremities for gangrene of the leg, and for gangrene of both feet. It probably more often follows an atheromatous process in the vein walls, such, for example, as may occur in connection with nephritis. Cases have been reported by Osler and by Chiene where the origin of the artery was involved in the wall of a small aneurism. That it may follow such lesions as intestinal ulceration, especially of the tubercular variety, intestinal cancer, splenic infarct, etc., is well known. On the other hand, there is no sufficient explanation for the fact that it so rarely follows typhoid fevers.

SYMPTOMS AND SIGNS.

The more complete the occlusion of the mesenteric vessels, *i.e.,* the more extensive the area suddenly deprived of blood

supply, the more sudden and more overwhelming will be the symptoms. Of these the most significant are as follows:

(1) *Sudden Onset.*—In the most severe cases this can usually be recorded by the watch, since patients indicate nearly the exact moment at which they began to feel severe pain, while the other symptoms follow so quickly as to make it a sudden and overwhelming affection.

(2) *Intensity and Character of Pain.*—This is sometimes paroxysmal, at others continuous. It is nearly always severe and often agonizing, and scarcely to be quieted by an ordinary opiate. Sometimes it is spoken of as intense colic; even mild degrees of the lesion are often accompanied by sufficient pain to present a prompt and very grave indication. On the other hand, rare instances are known in which the disease has run its course almost without pain.

(3) *Diarrhœa.*—This is usually an early symptom, the evacuations being profuse, and bloody after a few hours if not at first. It is met with in from 30 to 40 per cent. of cases.

(4) *Obstructive Symptoms.*—These are sometimes those of ileus, sometimes those of constipation, which may be followed by diarrhœa.

(5) *Vomiting.*—Usually occurring early; the vomit being bloody or even after a few hours fæcal.

(6) *Rapid Pulse,* which will be rarely less than 110 and may run as high as 130 or 140.

(7) *Subnormal Temperature,* which, though not constant, may be an occasional symptom.

(8) *Meteorism,* which begins early and becomes very marked.

(9) *Abdominal Rigidity.*—This, with the previous symptoms, prevents palpation or the discovery of anything which may ordinarily be made out by the sense of touch. These two symptoms constitute a most distressing and at the same time a most indicative feature, and by themselves indicate the gravity of the situation, while affording little or no opportunity for relief.

(10) Later and to the above may be added, perhaps, evi-

dence of the presence of fluid in the peritoneal cavity. In connection with the symptoms stated above, this can only be regarded as adding to the gravity of the situation. Yet a little later, although perhaps not much, will be added the features of complete collapse, delirium, etc., which precede death. When the inferior mesenteric artery is involved, it is said that tenesmus becomes a rather prominent characteristic, since the colon and rectum are partly supplied from this vessel.

When mesenteric thrombosis or embolism are suspected, one should carefully search over the rest of the body for similar lesions elsewhere; it would add to the certainty of the diagnosis should these be discovered. Küssmaul stated that pain about the navel indicates a lesion of the superior mesenteric artery, while when referred rather to the sacrum it means involvement of the inferior vessel. Litten believes that the so-called tea-ground stool indicates involvement of the upper vessel, while fresh blood in the stools is likely to come rather from the branches of the lower. Of course, a distinction between occlusion of the artery and vein is most difficult to establish, and is practically impossible unless evidences of the embolic or thrombotic process be found elsewhere. And even upon autopsy the deeper parts may be so softened and disintegrated that the ordinary post-mortem evidences of one or the other may be lacking.

DIFFERENTIAL DIAGNOSIS.

The principal conditions from which mesenteric thrombosis and embolism have to be distinguished may be catalogued as follows:

(1) *Perforating Ulcer of the Stomach and Duodenum.*—It has been estimated that from 6 to 25 per cent. of gastric ulcers perforate. A previous history which may be interpreted as an indication of gastric ulcer will be of very great help in diagnosis, if obtained. It must be remembered that ulcers upon the anterior wall of the stomach give few, if any, symptoms in at least many cases, and that in at least 10 per cent. of all cases no significant antecedent history is obtainable, even

from intelligent patients. Along with gastric ulcer may be also mentioned so-called *phlegmonous gastritis,* either general or localized, which in the latter form has also been described as *abscess of the stomach.* Of the former there are about fifty recorded cases.

The symptoms of perforating ulcer are sudden, stabbing, overwhelming pain, usually referred to the epigastrium, and perhaps radiating rather widely. Hæmatemesis occurs in perhaps 40 per cent. of the cases, while collapse and vomiting are well-nigh invariable accompaniments. Thirst in these cases is usually urgent and distressing. The abdomen first becomes rigid, then distended, and finally actually bulges. Should a patient rally from these first symptoms, they will be followed promptly by the ordinary signs and symptoms of peritonitis.

(2) *Acute Obstruction.*—This will include not only the ordinary varieties of strangulated hernia, but more especially perhaps the rare forms, such as diaphragmatic hernia, that through the foramen of Winslow, etc. It will include also the other forms of obstruction which may be produced suddenly, and more especially those conditions included usually under the terms intussusception, volvulus, and ileus, while the condition a few hours after onset may be essentially that first described. The onset itself is rarely so acute or sudden as in the mesenteric occlusion.

(3) *Pancreatitis.*—This may very closely simulate mesenteric occlusion; in fact, the symptoms would be nearly identical, and the diagnosis of pancreatic disease would probably be made on the doctrine of the chances, if on no other ground. Whether of the hæmorrhagic or the necrotic type, there would be little or no difference in the symptoms. But even in pancreatic disease the onset is not likely to be quite so sudden.

(4) *Acute Splenic Infarct.*—Acute necrosis of the spleen is known, and is usually due to sudden obstruction of the splenic vessels, corresponding to that of the mesenteric. Under these circumstances the spleen goes to pieces in very short time and the condition is practically always fatal. If it is to be distinguished from the other conditions already mentioned, it

will be largely by localization of pain, rigidity, and other features on the left side rather than in the central area of the abdomen. Should error arise, and this condition be detected instead of the other, it would be a less unpromising matter to remove the spleen than to attack an extensively necrosed bowel.

(5) *Acute Appendicitis.*—This may occasionally present features which entitle it to be placed in this category. This is equally true of those very rare cases of inflammation involving Meckel's diverticulum. In fact, all fulminating gangrenous appendicitis reproduces, in miniature, the far more extensive condition to which this paper is especially devoted. This tiny annex to the intestinal tract is especially often met with completely dead and sloughing, and it may afford an illustration of what may happen to the entire bowel under similar but greatly exaggerated conditions. While it thus affords such an illustration, it is not often that between this condition and the greater one confusion will arise; but it is possible that, following gangrene of the appendix, there may be extensive necrosis of those portions of the bowel which come in contact with it, so that when the abdomen is open extensive areas of gangrene may be met with. Such was the case in an instance recorded by me in the first number of the *Archives Internationales de Chirurgie*, and which I would briefly epitomize as follows:

A young man, sick four days, was brought to my clinic, a distance of some sixty miles, suffering acutely with all the usual symptoms of obstruction of the bowel. On arrival he was nearly collapsed and in quite unpromising condition. A greater resistance upon the right side of the abdomen than upon the left, accompanied by what I can only describe as an almost "doughy" feeling under the finger, led me to open in the right semilunar line. The condition revealed by the incision was in brief this: there had been acute gangrenous appendicitis, and in consequence thereof all the adjoining convolutions or loops of small intestine had adhered together, thus walling off the scene of gangrenous activity, while their exposed surfaces had themselves become infected and were now necrotic. The cæcum itself was also gan-

grenous. It was now a question either of multiple resection, which was quite out of the question when the patient's condition was considered, or of total resection of a great length of the affected bowel. The latter seemed the quicker procedure, while both of them seemed equally hopeless. Several inches of the cæcum and ascending colon were then removed, with the lower portion of the small intestine, the bowel being divided just above the uppermost gangrenous area, all the intervening portion being completely removed. The upper end of the colon was completely closed as well as the lower end of the small bowel, and an anastomosis made with the Murphy button. The entire length of intestine thus removed was 265 centimetres (eight feet nine inches). To my astonishment, the patient recovered. There was fæcal fistula for some weeks, which gradually diminished and finally closed, and the button was not passed for nearly three months; but the patient is to-day well and active, and apparently in nowise the sufferer because of loss of half of his bowel.

I mention this case because I think it fits in very properly and lends an illustration of possible hope in a class of cases which, save for some such procedure, would be positively hopeless. I assembled from literature sixteen other cases besides my own, where over 200 centimetres of the bowel had been resected. Of the seventeen, fourteen recovered. It is singular that where from 100 to 200 centimetres have been removed nearly 30 per cent. of cases have proven fatal.

This condition is worth alluding to again because it may happen, as in my case, that when one has opened the distended abdomen the first picture presented to his eye is one of widespread gangrene, for whose cause he must necessarily next seek in order that he may determine what next to do.

(6) *Acute Cholecystitis.*—This, which may prove a fulminating process, can usually be differentiated by a history of previous disease or gall-stone colic, and by the location of the tenderness and pain and the presence of a localized swelling. When present in its most acute form, it may lead to rapid necrosis. The gall-bladder dies sometimes as does the appendix.

(7) *Ruptured Extra-uterine Pregnancy.*—Within a little over a year it has happened to me to have three cases sent to my clinic for operation for appendicitis which proved to be ruptured extra-uterine pregnancy, and in one of these the widespread character of the pain, the alarming degree of collapse, and the abdominal rigidity which promptly followed, brought about a condition of affairs which, at first, at least led to speculation and error in diagnosis. Doubt of this kind can usually be settled by obtaining a significant menstrual and pelvic history; but if, as in one of my cases, the patient is too collapsed to give any history, or in another too stupid to make her statements reliable, it will be seen that doubt will exist until the abdomen is opened.

(8) *Intrathoracic Lesions.*—To your surprise, perhaps, I shall have to include here, among other conditions from which mesenteric thrombosis must be differentiated, certain intrathoracic conditions which may be very misleading and at the same time very serious. For instance, I have been more than once called to operate for acute appendicitis because of reference by the patient of his severe pain to the lower part of the abdomen, when a careful physical examination revealed a rapidly developing pneumonia, and I have seen this when the pneumonia was on the left side. My own experience in this matter coincides with that at least of some of my surgical friends with whom I have compared notes on the subject.

I may even mention one case of extreme interest which I saw with my colleague, Dr. Stockton, whose name is a guarantee of the carefulness with which the case was observed. The patient, an electrician, was taken late in the evening with an intense pain referred to the upper and left portion of the abdominal cavity. In addition to his pain, muscle spasm of that side became a prominent feature. There was a certain amount of nausea and vomiting, and everything pointed at first to an acute lesion somewhere in the upper abdomen, while the somewhat abnormal respiratory sounds made it seem possible that it might be a question even of strangulated diaphragmatic hernia. At the end of twenty-four

hours operation was advised, but temporarily declined by the patient, being delayed at least until the following morning in order to secure the presence of certain relatives. When morning came the case showed unmistakable evidences of pneumonic consolidation, and the next day not only revealed it as a case of well-marked pneumonia, but this was later followed by rapid and extensive empyema which required operation, and following which he eventually recovered.

I think it is well worth while to place such a case upon record because of its extreme instructiveness regarding an extremely complicated and difficult condition.

While this is not a comprehensive list, and while almost any unquestionably serious condition within the abdomen may lead to error in diagnosis, it nevertheless comprises the principal conditions from which we must endeavor to differentiate the truly and originally gangrenous lesions. Nevertheless, while in no way making light of diagnosis and while encouraging any and every attempt to perfect it, the fact remains that every one of these abdominal conditions mentioned calls for prompt surgical intervention, and, rather than waste hours of most valuable time in futile attempts at diagnosis, I would prefer to content myself with a recognition of the gravity of the existing lesion, of the uselessness of drugs, and of the urgent need for instant exploration. In these cases, perhaps more than in any others, the paramount indications for operation are all present; the intense pain, the collapse, the abdominal rigidity, which surely can be recognized within the hour when they occur, and which of themselves call for operation, without of necessity waiting for corroborative indications of vomiting of blood, meteorism, or other symptoms.

The only recorded case known to me of mesenteric occlusion not proving fatal is that reported by Chiene (*Edinburgh Journal of Anatomy and Physiology,* 1868, iii, 65) as met with in the dissecting-room. Here the branches of the cœliac and mesenteric arteries were found filled with the injecting material, while their main trunks were completely occluded by

an old embolic process. The cœliac axis was changed into an old fibrous cord and both mesenteric arteries were obliterated. The blood evidently reached the mesenteric arteries through the left and middle colic vessels, while the extraperitoneal vessels served for communication with the internal iliacs.

We must, however, be perfectly fair to the subject, and acknowledge that even an early exploration in the cases such as I began with would be of no avail. These are, however, extreme cases, from which valuable lessons in pathology may be drawn, though no lessons pertaining to operative surgery. While these cases, then, were extreme in their type, there are nevertheless other serious cases where the gangrenous process is not so extensive, and where resection of intestine might be of possible avail, as in the case which I have above reported. There are moreover a sufficient number of cases of lesser degree of gangrene where operation has been of great service, and no better illustration of this can be afforded than instances reported by Boston surgeons like Elliot, Mixter, and others.

Surely this is no place to go into the technique of operations of this character; every such case must be a law unto itself. Among other things that the surgeon will have to decide, and promptly, will be the question of drainage, posterior as well as anterior, of irrigation, character of sutures, etc. But any man who is competent to deal with such a case may well be trusted to adapt his measures to his own case and its environment.

In conclusion, I would like to make a general statement, and emphasize it, to this effect: That in the presence of sudden and acute symptoms, which include intense abdominal pain, collapse, and rigidity of abdominal walls, very little time should be wasted in speculation as to the character of the lesion. This triad of symptoms constitutes a reliable and exacting demand for abdominal section, followed by such suitable measures as the case may call for or permit. No such case as would be lost without an operation would be lost in consequence of it, while every such case must, without it, of necessity prove fatal. Of these cases, as of most others in the hands of competent men,

it should be said that they *die in spite of operation, not because of it.**

* The following papers may be advantageously consulted in this connection:

Talke. Ueber Embolie und Thrombose der Mesenterialgefässe, Beiträge zur klin. Chir., Band xxxviii, S. 743.

Neutra. Ueber die Erkrankungen der Mesenterialgefässe, etc., Centrlblt. f. Grenzgebiete, Band v, S. 705 *et seq.*

CHRONIC EMPYEMA OF THE GALL-BLADDER.

REPORT OF A CASE OF THIRTEEN OR MORE YEARS' DURATION.

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MRS. L., aged forty-three years, married at twenty-three, mother of ten children, family history negative. Had typhoid fever at the age of eleven, otherwise always well until nineteen years ago, at the time of her first puerperium, when she had what was called peritonitis. She had at the same time a sense of discomfort, with heat and "stinging" in the right side of the abdomen. At subsequent puerperiums she was troubled more or less in the same way. About six years after the first attack she had a second one of "peritonitis." It was at this time she first noticed a swelling about the size of an orange in the right hypochondro-lumbar region. This tumor was readily movable, and she does not recall that it was especially sensitive to pressure or caused any great amount of discomfort, beyond a sense of weight and dragging. She does not give a history of having had any definite attacks of biliary colic or other evidences of gall-stones, excepting that she thinks she has been somewhat jaundiced at times.

When examined in the summer of 1902, there was found a tumor about the size of a small fœtal head, evenly globular, and movable from the right iliac region to the region of the right kidney. It was not tender to pressure and it seemed a solid mass. She complained only of a dragging sensation in the right side, which was very exhausting, and some of the ordinary symptoms which accompany retroversion and metritis, both of which ailments she had. Operation was advised on the presumption that some pathologic condition of the kidney was present. Save for the conditions described above, the patient was in as good health as ever. At the time of entering the hospital, April 4, 1903, she was in practically the same condition as at the first examination.

Operation.—April 6, with the assistance of my associate, Dr. Adrian B. Perkey. Ether anæsthesia. Vertical incision about

twelve centimetres long at the outer border of the right rectus muscle, subsequently joining this with a lateral incision about six centimetres long. The tumor presented as a smooth globular body, non-adherent to the viscera, and apparently retroperitoneal. On its anterior surface was a placenta-like mass which looked much like a clot of blood beneath the peritoneum. Its superficial area was seven by ten centimetres and it was five centimetres thick. This mass was continuous at its upper end with a ridge of tissue which apparently contained the chief blood supply of the tumor, which was now found to be cystic in character. Aside from the placenta-like mass the cyst was of a light pinkish hue. The outer coat of the cyst was incised around the red mass, excepting at its upper part, and an attempt made to enucleate without rupturing the cyst, but after getting it about two-thirds enucleated a small rent was made letting out some thick, whitish yellow pus. As the peritoneum was well protected with gauze, this escape of pus gave us very little concern. Moreover, pus long confined usually becomes sterile, or nearly so. The pedicle of the cyst was in the shape of a very extensive ridge of tissue which seemed to come from the retroperitoneal tissue and the inferior surface of the liver. After having raised the cyst from its bed, we found that the red mass on its anterior surface was continuous with a sickle-shaped extension of the right lobe of the liver. This was ligated off close to the cyst. Search was made for the gall-bladder, but none could be found in the usual situation. The right kidney was found high in its fossa. Counter-opening was made near the border of the quadratus lumborum muscle, a gauze drain drawn through from within outward, and the abdominal wound sutured in layers. The patient made an uneventful recovery, without the occurrence of suppuration, and was curetted and operated for the retroversion about three weeks later. She is now (January, 1904) enjoying better health than she has had before for nearly twenty years.

During this operation we were ignorant of the nature of this cyst, although the possibility of its being a gall-bladder was mentioned, and its identity was not discovered until after completion of the operation, when it was opened and found to contain two gall-stones. The examination of the specimen removed was made by Dr. A. B. Perkey.

The pedicle of the cyst contained, of course, the remains of

the cystic duct, but the duct tissue was indistinguishable from other connective tissue of the pedicle. The placenta-like mass before mentioned was normal liver tissue, as shown by the microscope. The cyst measured thirty-five centimetres in circumference in its short diameter and forty-five centimetres in its long diameter. Its wall, aside from the part composed of liver tissue, was from three to five millimetres thick and almost completely calcareous. The lining membrane was rough and calcareous, like a calcareous aorta. Microscopic examination of the fresh pus showed a few cells, crystals of cholesterin, and fat globules. The stained pus showed mostly degenerate cells, no bacteria. Cultures on blood serum, two tubes, showed small, white, pin-point elevated growths, two on one and four on the other. Smears from these tubes gave diplococci—single and in chains—which were destained by Gram's method. The presence of these bacteria may have been due to accidental contamination. The gall-stones are of about equal size, one and a half centimetres in diameter, and present numerous facets, showing that they have been in contact with many stones. This hypothesis is in a measure borne out by the finding of much cholesterin in the pus contained in the cyst, although a certain amount of cholesterin may be found in pus anywhere. These stones have a specific gravity less than that of water and are composed mostly of cholesterin. As to the sickle-shaped process from the right lobe of the liver, there can be little doubt that it was caused by the constant dragging of the heavy gall-bladder upon its attachments.

A fair idea of the appearance of the anterior aspect of the cyst may be gained by reference to the accompanying cut (Fig. 1), made from a free-hand drawing, which represents about two-thirds natural size.

Gall-bladder; chronic empyema. The dark area represents liver tissue, the upper termination showing the point of severance from the pedicle. (Drawn by Dr. Perkey.)

TRAUMATIC PYELOPARANEPHRIC CYST.[1]

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THE facts of the case are as follows: The patient is a male, fifteen years of age, and was always perfectly well and sound up to his twelfth year, except for an attack of scarlet fever when very young. Parents perfectly healthy. Some time during his twelfth year, while shovelling snow, he was struck in the abdomen by the handle of the shovel, which necessitated confinement to bed for several days. After that time and until two weeks before admission to hospital, March 28, 1902, his health was good, except for a more or less continuous pain in the right side of abdomen.

Two weeks previous to admission, while attempting to jump on to a shed, the patient fell, his abdomen striking with considerable force on the edge of the roof of the shed. His condition required carrying home and going to bed, where he remained four or five days with nausea and vomiting during the first forty-eight hours, and with blood in his urine. The hæmaturia disappeared on the third day. After five days, the patient could get around the house, but abdominal pain persisted.

On date of admission, abdominal pain was intense, urine analysis was negative, general condition poor, and a small swelling was noticed in the right side of the abdomen on a level with the umbilicus. This swelling was dull on percussion; no record of further examination of this swelling, nor of temperature, was obtainable.

With hot local applications, etc., the condition became better until about the middle of April, when pain became intense, accompanied by abdominal distention.

An incision was then made over and down to the swelling, followed by incision into the same, which evacuated over a quart of bloody fluid containing several large blood-clots; while partial

[1] Read before the New York Surgical Society, December 23, 1903.

examination of the wall of the swelling showed it to be very thick and extending inward towards the kidney. A general diagnosis of cyst was therefore clear. The edges of the sac were then sutured to the edges of the abdominal incision and a tube inserted. The bloody fluid, according to pathologist's report, contained "no urine."

From that time until just before I first saw the case in September, 1902, the patient's general condition improved, and the wound and cyst cavity contracted until a regular sinus was formed. The sinus formation was complete in about six weeks after the incision, and remained stationary from then until September, in spite of local stimulating injections. During this period urine flowed freely from the sinus, and repeated examinations were negative except for the presence of a fairly large number of leucocytes. Drainage tube had been removed permanently since the middle of July.

From about August 15 until October 1, however, there developed a series of "attacks," three or four in number, each attack consisting of high temperature (104° to 105° F.); some delirium; pain and tenderness in and around the sinus, but no swelling; and cessation of flow of urine from the sinus.

Each attack lasted about two days and yielded readily to cathartics and introduction of a drainage tube and irrigation, when the flow of urine would be resumed.

On recovery, patient's general condition was a little worse each time. It was therefore decided to explore the sinus with the idea of removing the cyst wall.

The operation was performed October 3.

A word more as to the urine. During an "attack," as just stated, no urine came through the sinus, but the urine from the bladder was uninfluenced thereby, both in quality and quantity, the latter having become almost as much as if both kidneys were normal. The amount of urine from the sinus between "attacks" was a little less than normal each day. This precluded any necessity for finding out the condition of the other kidney should nephrectomy of the kidney on the side of the sinus be decided upon.

The operation proved to be difficult and tedious. A careful dissection (1) showed that the sinus ran into a large cavity; and (2) isolated enough of the cyst-wall of the latter for an accurate

diagnosis of the actual conditions, accompanied as it was by a wide opening up of the orifice of the sinus.

The conditions found are indicated in the title. Thus: the cyst-wall, thick and dense connective tissue, was closely adherent to the surrounding paranephric tissue, beginning right at the orifice of the sinus, the partial isolating just referred to being followed constantly by profuse venous hæmorrhage. Following this wall in towards the kidney, the inner surface was also exposed and found to be covered by flabby granulations. These were scraped off, and then it was plain, by looking into the cavity, that the cyst-wall extended to and into the renal sinus. In other words, there was direct continuity of tissue between the paranephric-tissue part of the cyst-wall and the renal-pelvic portion thereof. Therefore there was a tear in the wall of the pelvis, and with each edge of the tear was connected a corresponding part of the paranephric cyst-wall. There was also considerable dilatation of the pelvis as a whole.

Hence, the cyst-wall was partly pelvis and partly thick condensed paranephric tissue, thus justifying the title, pyeloparanephric cyst.

Further confirmation was obtained by observing and probing two infundibula whose orifices opened proximally into the cyst cavity; and also by finding the opening of the ureter from within the cyst. A probe was passed into the ureter, but could go no farther than two or three inches, owing to thick granulation tissue in the lumen of the tube. Although tough, the cyst-wall was fairly elastic and was probably stretched by accumulation of urine during the attacks previously mentioned. There were also found a few ridges running in all directions around the inner surface of the cyst-wall, which might have caused the obstruction to the outflow of urine also mentioned as one of the phenomena of the "attacks." At all events, no other cause for this obstruction could be found.

These conditions, although serious, did not seem in themselves bad enough to account for the high temperature and delirium occurring in the "attacks," because the thickness of the cyst-wall was apparently sufficient to prevent any absorption of toxins or micro-organisms. This being so, one naturally would think of the kidney as causing these symptoms as the site of either a nephritis (with bacteria and bacterial toxins), or a condition in

which toxins (non-bacterial) were being elaborated by faulty metabolism of the kidney-cells, the general condition then being an auto-intoxication rather than a septicæmia (or toxæmia) as it would be if the local condition were a nephritis.

The kidney was therefore partially exposed, and one or two small but deep incisions into it were followed only by blood. As no pus was found in the cavity of the cyst, this showed the probability of the nephritis being in the form of small foci of pus; since it seemed that the nephritis must be suppurative because of the severity of the general symptoms. The kidney could be palpated and was soft and large. Realizing that if small foci of pus were present, the other kidney might also be similarly affected, it was nevertheless felt that nephrectomy should be done, because of the progressive impairment of the patient's general health, and because the other kidney had shown absolutely no signs of any trouble at all.

Nephrectomy was accordingly performed. Many adhesions were found and much hæmorrhage occurred. An attempt was made to take out the entire cyst-wall with the kidney, but was abandoned, owing to adhesions and loss of blood. Therefore, the kidney, being now free, was removed, together with its adrenal body, the cyst-wall being cut right across at about its connection with the pelvic wall. Some two inches or so of the ureter below and outside of the cyst-wall were exposed and removed. There was now left in the wound only a good bit of the adherent original cyst-wall. The piece of ureter removed showed granulation tissue throughout; and the kidney on being split showed multiple pus foci, but almost of microscopic size. The pathologist confirmed the diagnosis, and also excluded tuberculosis both renal and ureteral. Any share in the cyst formation on the part of the kidney or adrenal body was also positively excluded. Most of the wound was sutured, a drain of gauze being inserted where cyst-wall was left.

Uneventful recovery except for wound. Thus, some six or eight weeks after operation the patient was in perfect health and had gained ten or twelve pounds. Locally, however, the wound had become a sinus with the usual small amount of seropurulent discharge. It showed no signs of healing in spite of the usual stimulating injections. A week later a piece of silk ligature came away. Still no advance for another week. Ether was then given

and the sinus was laid open freely, and, as suspected, the remains of the cyst-wall were found just as large and tough as at the end of the first operation. Although hæmorrhage was profuse, there was no reason (the patient being in good condition) for stopping the operation and leaving any of the cyst-wall behind; so it was all dissected off and the wound partially sutured and partially packed with gauze. The patient was out of bed in three days, and the wound solidly healed at the end of two or three weeks.

Of course, the interesting and probably unusual aspect of this cyst is not that it was chiefly paranephric,—since paranephric cysts are fairly common,—but that the paranephric part was so closely connected with the renal pelvis that there was not only a cavity in common, but also a continuous cyst-wall, first of paranephric tissue and then of the pelvic wall. Just how unusual this condition may be I have been unable to find out; but that it is certainly uncommon may be inferred from as much of the literature as I have been able to look up. (See Bibliography at end of article.) The cause of the cyst, judging from the history and the findings, was undoubtedly traumatism; discussed more fully in later paragraphs. The research into the literature,—for most of which I wish to express my thanks to Dr. J. F. McCarthy of this city,—while not exhaustive, was thorough, and resulted in finding mention of many pathologic renal cysts; of a few traumatic renal or traumatic paranephric cysts; but no mention at all of pyeloparanephric cysts, either pathologic or traumatic.

An attempt will now be made to assign the cyst to its proper place among cysts in general and cysts of the "kidney region." Hence a short review is necessary of *cysts in general* and "renal cysts" (the last expression being used generically to express all cysts in the "kidney region," that is, cysts of the kidney, of the adrenal body, of the pelvis of the kidney, and of the paranephric tissue).

Beginning with *cysts in general,* there are three main classes: (A) Truly neoplastic cysts, that is, cysts which are really neoplasms, often called *cystomata;* (B) Parasitic cysts;

and (C) Cysts which are neither neoplastic nor parasitic. This classification, of course, also applies to cysts in the "kidney region."

(A) *Cystomata* or *Neoplastic Cysts.*—These are being considered more and more in connection with true solid neoplasms, with which they have far more in common both structurally and in etiology, than they have with "cysts." The structure of their walls, including that of the lining, is often quite complicated, so much so that the walls alone of a cystoma are almost, if not quite, identical with the structure of a solid neoplasm, thus differing entirely from the simple fibrous membrane of ordinary cysts or of the cyst which is the subject of this paper; while their contents is usually found to be made up of cell-elements mixed in with fluid or semi-solid tissue, very different from "serum" or "blood" of ordinary cysts. Many cystomata are also multilocular.

Coming to the "kidney region," the cystomata are exceedingly complicated, and their origin is only in the kidney or adrenal body, or both. This origin from the cells of the Wolffian body and other embryonic structures and from inclusions of "adrenal rests" shows their complicated nature. We may therefore safely exclude our cyst from the category of cystomata, especially of the kidney or adrenal body, if for no other reason than because no such findings resulted from the removal and examination of these structures.

(B) *Parasitic Cysts.*—This class needs only to be mentioned to be excluded from consideration. Even in the "kidney region," the kidney "adrenal" and ureter are out of the question, as the result of the operation shows. There remains the paranephric tissue, in which there may develop parasitic cysts; but the cyst under description is certainly not of that kind.

(C) *Cysts which are neither Neoplastic nor Parasitic.*—There are many varieties described, the chief difference between them seeming to be in many cases etiological rather than structural. The subdivisions generally accepted are: (1) Glandular retention cysts; (2) Cysts in pre-existing spaces other than

the alveoli of glands; and (3) Cysts of new formation occurring where there are no pre-existing spaces.

(1) Glandular retention cysts. From the nature and history of the case, these cysts may be excluded; especially those of the kidney and "adrenal;" nor could the cyst have had its origin as a "retention cyst" of one of the minute glands in the wall of the pelvis. There are manifestly no glandular "retention cysts" of the paranephric tissue, that is primary ones.

(2) Cysts in "pre-existing spaces other than alveoli of glands." Among these are: distended bursæ; ganglia (of tendon sheaths); hydrocele, and hæmatocele; all comprising the "transudation cysts" of some authors. There should be added: dilated lymphatics (often called simple serous cysts or hygromata), and dilated blood-vessels or "blood-cysts." The last named must not be confounded with either hæmatoma (a cyst of new formation) or angioma (a neoplasm). Nor must the serous cysts be confounded with lymphatoma (a cyst of new formation) or lymphangiectasis (a neoplasm).

Referring to the "kidney region," and excluding "kidney" and "adrenal," there are the renal pelvis and the paranephric tissue, which may be the sites of these cysts.

Taking, first, the renal pelvis. The "pre-existing space other than alveoli of glands" would be the cavity itself of the pelvis. A cyst developing here might grow without involving kidney or ureter; or it might remain stationary; or it might involve the kidney or ureter; or its contents might break through the pelvic wall. Comparison with the cyst under discussion shows that a portion of it, *i.e.*, the part whose wall is renal pelvis, is identical with these cysts; or, in other words, is a cyst occurring in a "pre-existing space other than alveoli of glands."

Regarding, in the next place, the paranephric tissue. Part of the cyst occurred in this tissue. If it developed in a "pre-existing space other than alveoli of glands," the "space" would have to be the lumen of blood- or lymphatic vessels which are in the paranephric tissue. Against this possibility, however, are several objections: First, these "lymphatic or blood cysts"

are rarely, if ever, found in a region subjected to such a severe traumatism as we know was inflicted on the patient. Secondly, these "lymphatic or blood cysts" are so slow in growth and possessed comparatively speaking of such a delicate wall that communication with the cavity of the renal pelvis through its tough fibrous wall could not be established traumatically without a traumatism so severe as to destroy the delicate cyst wall entirely. Furthermore, this statement includes an assumption of the existence of the cyst prior to the traumatism, of which there is absolutely no evidence. Again, the cyst wall found was anything but "delicate;" in fact, was as tough as the renal pelvis itself.

(3) Cysts of new formation, or those occurring where there are no pre-existing spaces. Among these are: hæmatoma; lymphatoma; a "cyst wall" of thickened tissue enclosing a foreign body; and "cysts of degeneration." All these cysts have a fairly thick capsule and one which is more or less distinct from the surrounding tissue. The contents is usually "serum;" and, if of long standing, it is often impossible to tell whether a cyst, with "serum" as contents, was originally a lymphatoma or a hæmatoma. "Cysts of degeneration" may be found in tendons as a variety of "ganglia" (distinct from that in tendon-sheaths already mentioned); or as a direct sequela to a "productive inflammation," in which case they are often multiple and small ("cystic degeneration" of some authors); they also occur in the tissue of some solid neoplasms.

In the "kidney region." Cysts of new formation in the kidney and "adrenal" may be absolutely excluded. In the pelvic wall have been recorded small cysts occurring from traumatism and containing blood; also cysts of degeneration. These may also be excluded.

In the *paranephric tissue*, on the other hand, "cysts of new formation" are fairly common as the result of severe traumatism, and may be lymphatomata, but are usually hæmatomata. When we consider the structure of such cysts and compare it with that of the cyst under consideration, it would seem

certain that the latter, that is the larger part of it, is a "cyst of new formation" in the paranephric tissue.

Having now placed our cyst, with, as we know, its close relation to traumatism, in *two* subdivisions of cysts "which are neither neoplastic nor parasitic," a probably correct explanation of its method of formation may be had from a consideration of the etiology and method of formation of these cysts.

In the etiology of "cysts occurring in pre-existing spaces other than alveoli of glands" and of "cysts of new formation," traumatism is the most important factor, either as a predisposing cause or as a direct or exciting cause. This statement, though apparently simple, may lead to misapprehension; hence the following explanation: Cysts of these two subdivisions, when due to traumatism, are either recent or not. If *recent*, the contents (blood, serum, or traumatic œdema) is *directly caused* by the traumatism; but the capsule, as such, has not yet formed; and the "limiting wall" is simply the wall of the "space" (stretched or torn as the case may be) or the surrounding tissue (if no "space" exists). In this stage the cyst is not complete, *i.e.*, it has no capsule of its own.

If the cyst is not recent, its own capsule has had time to form, the formation consisting of a thickening of the tissue immediately around the contents and a differentiation, more or less complete, of the same from the more remotely surrounding tissue; all this is especially well marked in "cysts of new formation." This thickening, due to irritation from the presence of the contents, is regarded by some pathologists as a "productive inflammation;" but by others as a form of degeneration, *e.g.*, a "fibrosis." Furthermore, the contents also is apt to undergo changes, especially if blood (absorption of coloring matter, deposit of fibrin, etc.). Hence the traumatism, in these "complete" cysts, is predisposing, the exciting cause being the fluid first produced.

Referring now to the case described, and comparing with what we know of it that which has just been outlined, we may assume that: (*a*) the first traumatism ruptured the pelvis of the kidney and also caused a hæmatoma both within the pelvic

cavity and in the paranephric tissue; (*b*) as time went on the blood was gradually absorbed, and the thickened capsule (extrapelvic portion) of connective tissue was formed (as just described) from the paranephric tissue; (*c*) the opening into the pelvis, however, remained, but the capsule (extrapelvic portion) was strong enough to hold any urine that might come through and prevent its extravasation; and (*d*) the second traumatism caused a fresh hæmatoma, partly by tearing the inner surface of the capsule as indicated by the ridges referred to in the history, and partly by causing small lacerations of the kidney.

Hence, as already stated in making the individual comparisons, we may repeat (1) that the cyst, or rather cyst wall, having two parts, the one (pelvic portion) corresponds to that of cysts occurring in "pre-existing spaces other than alveoli of glands" and the other (extrapelvic portion) corresponds to that of "cysts of new formation;" (2) that, as regards the cyst as a whole, both portions make a common capsule enclosing a common cavity; and (3) that traumatism was the predisposing cause.

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TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, Wednesday, December 9, 1903.

The President, HOWARD LILIENTHAL, M.D., in the Chair.

INTESTINAL OBSTRUCTION FOLLOWING APPENDICITIS.

DR. LUCIUS W. HOTCHKISS presented a man, fifty-four years old, who was admitted to the J. Hood Wright Hospital October 23, 1903, with the usual signs of an acute, progressing appendicitis. His past history was negative, with the exception of the fact that he had been addicted to the rather free use of alcoholic stimulants. Three days prior to his admission he began to suffer from an acute pain in the right iliac region, which gradually increased in severity. He had vomited a number of times and had been unable to retain any nourishment. Upon admission, his temperature was 102° F.; pulse, 120; respirations, 32. Four hours after his arrival at the hospital he was placed on the operating table. Under gas and ether anæsthesia an incision was made to the outer side of McBurney's point, through which a small amount of sero-sanguineous fluid and about half an ounce of thick pus escaped. The appendix, which was about five inches long and bound down by numerous adhesions, was freed and excised in the usual way, and the stump invaginated. After washing out the wound with peroxide of hydrogen and salt solution, a cigarette drain was inserted and the wound closed in layers about the drain. Upon examination, the proximal end of the appendix was found to be gangrenous, while its distal half was considerably inflamed: it contained a blood-clot and pus.

The patient had taken the ether badly, and became very noisy and troublesome at the completion of the operation. He devel-

oped a delirium which lasted for several days, and required constant restraint. While in this condition he succeeded on one occasion in getting out of bed. Four days after the operation he was again perfectly rational. There was a slight discharge from the granulating wound. He continued to improve, and on November 7 he was able to sit up for a short time. On this day he began to complain of pain in the rectum, with a constant inclination to defecate, although his bowels had not moved in thirty-six hours. The pain in the rectum persisted, and an examination revealed a soft, fluctuating mass bulging into the anterior wall of the bowel, about three inches above the sphincter. There was also tenderness above the pubes.

On November 8 Dr. Chase, the assistant surgeon, made a median incision below the umbilicus, and found the intestines matted together into a large mass. The bladder could not be recognized at first, but upon inserting a sound, it was found to the right of this mass, bound down by adhesions. Upon attempting to free it a large abscess cavity occupying Douglas's pouch was opened, followed by a free escape of very foul-smelling pus and flakes of fibrin. When the bladder was freed, it immediately resumed its normal position. The adherent loops of intestine were freed as far as possible, and in doing this numerous small pockets of pus were evacuated. The abdomen was thoroughly irrigated with saline solution, and a large cigarette drain inserted leading down into Douglas's pouch. On the following day the patient had a free movement of the bowels. His further recovery was uninterrupted, and he was discharged from the hospital on December 4.

Dr. Willy Meyer referred to a similar case coming under his care. Eleven days after an operation for perforative appendicitis the patient developed all the classical symptoms of intestinal obstruction, and upon reopening the abdomen he came down upon a mass of matted intestine and omentum. Upon separating the adhesions he again heard the peculiar gurgling sound indicating intestinal obstruction, and upon further investigation he found in the left lumbar region an abscess containing a large amount of stinking pus. This was evacuated and drained. The intestinal obstruction promptly disappeared and the patient eventually made a perfect recovery.

Dr. F. Kammerer said the cause of the intestinal obstruction

described by Dr. Hotchkiss was certainly a very rare one. It was at times difficult to differentiate between intestinal obstruction and a well-developed peritonitis, with symptoms of obstruction. Even if peritonitis was not general, such symptoms might be present. That a circumscribed collection of pus, however, should give rise to acute intestinal obstruction in a mechanical way he was somewhat loth to believe. It rather seemed to him that after evacuation of the abscess such mechanical disturbances might arise.

Dr. Willy Meyer said that in his case there was no reason to suspect that the obstruction was a retroperistalsis due to acute peritonitis; for eleven days had elapsed since the operation and the patient was practically well when the symptoms of obstruction suddenly intervened. The speaker said he did not attribute the obstruction to the presence of the abscess, but to a kink of the matted intestines that formed the wall of the same.

Dr. Lilienthal said he thought the mere fact that pus was present had nothing to do with the case. The important factor was the mass of adhesions, which in the cases reported by Drs. Hotchkiss and Meyer happened to form the wall of an abscess. Adhesions resulting from anything else might likewise give rise to obstruction.

Dr. Hotchkiss said that a few years ago he had read a paper before the Society in which he reported three cases of obstruction following appendicitis occurring in the course of his own work, and also a number of cases observed by others. It seemed to him that these cases may be divided into two classes: First, those in which the obstruction occurs in the afebrile period, that is to say, from two or three weeks to two or three months or longer after the original operation. These cases are easily to be recognized, and are due either to kinking of the gut by adhesions or its strangulation by bands. The second class embraces those cases which come on soon after operation, or as early as the second or third or fourth day later, that is, during the afebrile period, and which are generally regarded as cases of extending peritonitis, which are not operated upon, and are generally fatal. These latter cases, which are often masked by symptoms of peritonitis, he regarded as the most dangerous because they are most often unrecognized. That these cases can be successfully dealt with by prompt operative measures he thought had been abundantly demonstrated.

GASTRODUODENOSTOMY (FINNEY'S METHOD).

DR. HOWARD LILIENTHAL presented a man, forty-two years old, who was admitted to Mt. Sinai Hospital on May 21, 1903. He had been sick for three years with constantly increasing abdominal discomfort, associated with vomiting. The vomited matter consisted principally of mucus and food, never blood. The patient's symptoms gradually became more aggravated. He became emaciated, and a physical examination of the chest revealed dulness over both apices. Tubercle bacilli were found in the sputum.

An examination of the stomach contents revealed the presence of free hydrochloric acid, and after further observation a diagnosis of benign stenosis of the pylorus was made. May 23 gastroduodenostomy by the Finney method was done, and the wound was closed with a cigarette drain. The next day the man vomited some blood and his temperature was slightly elevated. There were no other untoward symptoms, and six days after the operation the man was allowed solid food. He was discharged June 13 entirely well. Since then he had gained sixty pounds in weight, and his pulmonary and abdominal symptoms had entirely disappeared.

RESECTION OF PYLORUS FOR BENIGN STENOSIS.

DR. FREDERICK KAMMERER presented a woman, fifty-three years old, who had been under treatment since last summer for gastric trouble which dated back to May of the present year. She had been under the care of various physicians. She complained of all sorts of gastric disturbances, including sour taste, eructations of gas, vomiting, etc.; in short, symptoms of gradually increasing stenosis of the pylorus. When the speaker first saw her, about two or three months ago, she presented the typical picture of pyloric stenosis. The stomach was dilated, reaching midway between the umbilicus and symphysis. She vomited frequently, and when her stomach was washed out particles of food that had been introduced two or three days before were found. Peristaltic movements of the stomach were readily visible through the abdominal walls. At a previous examination, before her admission to the hospital, lactic acid and hydrochloric acid in small quan-

tities were found in the stomach contents; but when the latter were examined at the hospital, two months later, hydrochloric acid was absent. To the left of the umbilicus a freely movable, hard tumor, about the size of a walnut, was distinctly made out through the lax abdominal wall. A blood examination showed between 40 and 45 per cent. of hæmoglobin.

Through a median incision the stomach was exposed and a tumor about the size of a small egg was found involving the pylorus. A resection was done by the usual method, removing the entire lesser curvature and at least one-half of the greater curvature far beyond the actual site of the growth. Instead of employing Kocher's clamps, as he usually did in these operations, Dr. Kammerer said he used Mikulicz's clamp on this occasion. About one inch of the duodenum was also removed. The open ends of the stomach and the duodenum were now closed by a double running suture of silk, and a posterior antecolic gastro-enterostomy performed, the parts being easily approximated without the slightest tension. A Murphy button was used. The patient made a good recovery. The button passed on the eleventh day. A microscopic examination of the growth showed it to be purely fibrous. In the course of the operation two infiltrated glands were found and removed,—one was located in the lesser and one in the greater omentum. The case illustrates the difficulties of an accurate diagnosis between malignant or benign stenosis in some cases.

CHRONIC PANCREATITIS.

Dr. Kammerer presented a woman, forty-eight years old, who had enjoyed good health up to eight weeks before her admission to the hospital. She gave no history of jaundice or malaria, but had had repeated attacks of rheumatism. For the past eight weeks she had suffered from pain in the epigastrium, general gastric distress, and occasional vomiting. About a fortnight before her admission her symptoms became more acute, and she suffered from severe pain in the abdomen and lumbar region and in the legs. Her appetite was poor; she had constant headaches and felt feverish. At about this time jaundice appeared and had persisted since.

When she came to the hospital, October 14 of the present year, the jaundice was very marked, but otherwise the examination proved entirely negative. She was kept under observation for several weeks, during which time she became more deeply jaundiced, and in order to clear up the diagnosis an exploratory operation was done October 26. The gall-bladder was found to be of normal thickness but somewhat enlarged and filled with bile. No stones could be detected. The common duct was thoroughly exposed by incising the peritoneum to the outside of the duodenum and entering the retroduodenal space, but nothing abnormal was found. The surface of the liver was slightly nodular, and the possibility of a beginning cirrhosis suggested itself. Upon examining the pancreas, a distinct tumor in the head of that organ was made out. It was about the size of a small egg and clearly outlined. A cholecystoduodenostomy was done, when, upon opening the duodenum, a large amount of bile escaped into the intestine, showing that the obstruction, which was apparently due to the tumor in the head of the pancreas, had been at least momentarily overcome (most probably by manipulation with the gall-bladder). The patient made an uneventful recovery from the operation, and has improved wonderfully since. The jaundice gradually disappeared and has not recurred.

Dr. Kammerer said he regarded the case as one of chronic pancreatitis which had been relieved by the operation. Whether it would have been wiser to do a simple cholecystotomy was an open question.

In reply to a question as to whether he followed the common bile duct as it entered the head of the pancreas, Dr. Kammerer said he was satisfied that it contained no stone.

Dr. Willy Meyer said he had a similar case about three years ago. The patient was also a female, with pronounced jaundice. No stone was found; nothing but this infiltration involving the head of the pancreas. He did a cholecystostomy, which resulted in quite a troublesome fistula, but the wound finally closed permanently. Dr. Meyer said that in the treatment of this class of cases he would perhaps try first a cholecystostomy, and that failing, he would resort to permanent union between the gall-bladder and intestinal tract.

GASTRO-ENTEROSTOMY WITH ENTERO-ENTEROSTOMY (ELASTIC LIGATURE).

DR. WILLY MEYER presented a man, sixty years old, who had had an intestinal hæmorrhage in 1894, and after its occurrence he began to complain of symptoms of chronic gastritis. These were not serious enough to interfere with his business until one year ago, when, while travelling abroad, he had a fainting spell and vomited. The vomited matter did not contain any blood, but on the following day he had a large, tar-like stool. From this attack he slowly recovered, and afterwards all his former gastric symptoms increased in severity. He was treated by a number of specialists, both here and abroad, who washed out the stomach and advised against operative interference.

In August, 1903, he had a third intestinal hæmorrhage. He became much reduced in weight and strength, and finally consented to an exploratory operation. The specialist who had been consulted abroad thought the lesion was an ulcer of the pylorus, but when the patient was admitted to the German Hospital in this city, a chronic ulcer of the duodenum was regarded as the probable diagnosis.

Upon opening the abdomen, nothing was found on the anterior or posterior stomach wall nor at the pylorus, but a thickened area in the duodenal wall could be distinctly made out. A posterior gastro-enterostomy was thereupon done by the McGraw (elastic ligature) method, the No. 3 ligature being employed. In uniting the stomach and small intestine, a continuous suture was used, and this gave rise to so much tension later, when tightening the ligature, that a tear in the stomach wall occurred. This was immediately closed with four interrupted sutures. In order to avoid the formation of a vicious circle, an additional entero-enterostomy was done also by means of the elastic ligature.

The patient made an uninterrupted recovery, and was given liquid nourishment by the stomach at the end of forty-eight hours. He had a few attacks of vomiting shortly after the operation, but was able to leave his bed in five weeks. Since the operation he had gained over twenty-five pounds in weight, and had had no further gastric symptoms.

ARTHROTOMY FOR IRREDUCIBLE SUBCORACOID DISLOCATION.

DR. LUCIUS W. HOTCHKISS presented a man, thirty-eight years old, an iron-worker, who was admitted to the hospital last July for an irreducible dislocation of the right shoulder-joint of ten weeks' standing. The dislocation was of the subcoracoid variety, and it could not be reduced by any of the usual methods.

July 28, 1903, an arthrotomy was done to effect reduction. The usual incision was made between the pectoralis major and deltoid, and the head of the bone exposed. It was extremely difficult to make out the exact anatomical relations of the parts, and before reduction could be accomplished it was found necessary to divide, in succession, the long and short heads of the biceps and all the muscles attached to the greater tuberosity. It was impossible to make out what particular muscle had prevented reduction before their division, though the subscapularis was last divided, and after this reduction was effected. The wound healed by primary union, and the arm was treated first by passive and subsequently by active motion. Since the operation, the function of the limb had gradually improved, and the man had returned to his work and was again able to use a heavy sledge-hammer. The head of the bone was now in its proper position, but ankylosed, and the range of motion constantly increasing.

Dr. Hotchkiss said that in another case of irreducible subcoracoid dislocation in which he had also performed arthrotomy last summer, the operation was done for persistent neuralgia caused by pressure of the head of the bone on the brachial nerves. The pain was entirely relieved by the operation, and the functions of the shoulder-joint, which in this case were very good before the operation, were not impaired.

DR. JOHN F. ERDMANN said that about a year ago he saw a case of subcoracoid dislocation in which the capsule of the joint had a button-hole tear which grasped the neck of the humerus, preventing its reduction by the usual methods; that in addition there was a complete evulsion of the greater and lesser tuberosities, and that the long head of the biceps was displaced outward and wound spirally around and posterior to the head of the humerus. Operation was done; a torn portion of the tuberosities was removed, capsule was split transversely, and the tendon of

the biceps reduced; this procedure being followed by easy reduction; the tear cut in the capsule was sewn as much as possible, although a gap was left in the tear about one-quarter inch wide. This was bridged over by a continuous suture of kangaroo tendon.

Patient when shown had practically all the functions with which the shoulder-joint is endowed, except that of retaining the arm in condition of hyperextension from the body.

Dr. Willy Meyer said that Dollinger considered the subscapular muscle to be the chief offender in the prevention of reduction in this form of shoulder dislocation. As soon as its tendon had been divided, and no other besides, reduction generally was feasible.

Dr. Hotchkiss said that, although the head of the humerus was underneath the coracoid process, there was a distinct membrane covering the head of the bone. Probably the lower end of the capsular ligament had been torn, and a portion of it had been carried forward with the head. The long head of the biceps was cut because it was very taut, and apparently was partly responsible for the interference with reduction.

POSTOPERATIVE INTESTINAL OBSTRUCTION.

Dr. George E. Brewer presented a girl, thirteen years of age, who was admitted to the Surgical Division of the Roosevelt Hospital, in October last, suffering from abdominal pain, vomiting, and general weakness. One year before admission she had undergone an operation for acute appendicitis with abscess, from which she slowly recovered.

The present illness began five days before admission, with colicky pains in the abdomen and slight distention. Various cathartic remedies were employed, but without result. The lower bowel was emptied by an enema. The vomiting was at first moderate, but became more violent and persistent during the second and third days. On the fourth and fifth days there was an apparent subsidence in the acuteness of the symptoms, but no movement from the bowels or passage of flatus, although high enemata were constantly employed. On the sixth day of her symptoms she was seen by the writer, who found her in an extremely critical condition; the temperature was 101° F., the pulse 120, weak and compressible; the face drawn, the eyes sunken, the extremities

cold, and the entire body bathed in cold perspiration. There was considerable distention of the abdomen, with tenderness and slight rigidity over the lower right rectus muscle.

She was immediately prepared for operation, and under ether anæsthesia an incision, eight inches in length, was made through the right rectus muscle, and the transverse colon sought for and found to be collapsed. The cæcum was next examined, and also found to be empty. The ileum, at its junction with the cæcum, was found and traced downward to the pelvic cavity. About seven inches from its colic extremity it was found to be acutely constricted by a loop passing under a firm fibrous band, the result of her former appendicitis. Beyond this loop the small bowel was greatly distended. As soon as the constriction was relieved, fluid and gas were seen and heard to pass rapidly to the colon. The point of constriction was dark in color and ulcerated. It was protected by suturing a layer of the omentum over its injured segment, anchored near the cutaneous margin, and a large Mikulicz tampon introduced, as it was feared a fistula would result. The tampon was allowed to remain in place two weeks, after which the wound slowly healed. The recovery was uneventful.

GASTRO-ENTEROSTOMY.

Dr. John Rogers, Jr., read a paper with the above title, for which see page 512.

Dr. Willy Meyer said his experience with gastro-enterostomy by the elastic ligature method was limited to four cases. Of these, three had recovered and one died, probably of acetonæmia or of sepsis. If the technique of the method was properly carried out, he did not see how the ligature could fail to cut through. He preferred the No. 3 ligature, which was certainly strong enough for the purpose. A very favorable feature of the method was that it effected an anastomosis of good size, at least one or two inches. Another point in its favor was that it could be done very rapidly. The speaker said he was formerly a strong advocate of the use of the Murphy button in these cases, but one serious objection to its use was that it was apt to fall back into the stomach and eventually do harm. The latter was not always the case, however, as he knew of one instance where the button was located in the stomach by means of the X-rays five years after operation, and its presence there had apparently not given rise to any injurious symptoms.

Dr. Erdmann said that in one case where he did the McGraw operation the patient, a man sixty-two years old, died on the seventh day from asthenia. The patient was fed by the mouth on the third day; this apparently set up vomiting, and rectal feeding was again resorted to. At the autopsy, a section of the stomach and intestine was removed, and the stomach wall showed a distinct slough, about the size of a silver quarter, which apparently would have come out in the course of another twenty-four hours. The slough consisted of that portion of the stomach wall that was tied off by the ligature, and the question arose in his mind whether by this method (the McGraw) the tissues were cut through or caused to slough out. There was no peritoneal invasion.

Dr. Erdmann said that this class of patients was usually asthenic, and the early introduction of food into the stomach was a very important factor. On that account he favored the use of the Murphy button, which was usually surrounded by a sufficient plastic exudate in the course of eight or ten hours after the operation to permit the introduction of peptonized milk into the stomach. In one case where he used the button the patient was able to sit up in bed in twelve hours and take broth and peptonized milk.

Dr. John B. Walker said that his experience had led him to favor the posterior operation, suturing if possible; if this could not be done, he used the Murphy button, and did an entero-enterostomy to avoid the formation of a vicious circle.

Dr. F. Kammerer said he had found the posterior operation with the button entirely satisfactory, and he had never had a vicious circle occur. He did not think it necessary to do an additional entero-anastomosis when the posterior operation was done. In former years, when he used Abbe's rings and Senn's plates and the simple suture, and operated by the anterior method, the formation of a vicious circle was not infrequently observed. The speaker said he thought the application of the McGraw ligature and the running suture would take fully as much time as the introduction of the Murphy button without the reinforcing sutures; the latter he did not think were essential, and he never used them.

Dr. Willy Meyer said the possibility of the Murphy button dropping back into the stomach was an objectionable feature to its use in gastro-enterostomy. If this accident could be success-

fully eliminated, it would represent the best artificial means of doing this operation. So far, we had no means at our disposal to surely prevent its occurrence. By the application of the ligature or sutures the use of this foreign body could be avoided. It should not be employed in those cases where there was any suspicion of an ulcer of the stomach.

Dr. Howard Lilienthal said he thought the subject could be divided advantageously into two parts,—one relating to malignant and the other to non-malignant cases. In the latter class of cases he had done the Finney operation four times, and it apparently left nothing to be desired. It was simple, rapid, and clean, and in all four of his cases the patients made a rapid recovery. His last case was one in which the Finney operation was secondary to an operation for pyloric stenosis, in which he had found a band constricting the duodenum. This was divided and the cause of the obstruction was thought to be relieved, but no relief in the symptoms followed the operation. Four days later the wound was reopened and a Finney operation was done. The pylorus itself proved to be the real cause of the obstructive symptoms. The speaker said that Finney himself did this operation also in cases where there were good-sized masses and adhesions about the pylorus, and where, under ordinary circumstances, another operation would be considered preferable. In the malignant cases in which gastro-enterostomy without any resection was indicated, Dr. Lilienthal said he was very much in favor of the button. He knew of cases where the button dropped back into the stomach, and had even devised a special button to prevent the occurrence of that accident. One-half of this button was big, the other half small; he had never had this modified button drop back into the stomach, nor had he seen this accident occur with the Weir button. The posterior operation was the one he always favored. The speaker recalled one case where two Murphy buttons were used in the abdomen, and both failed to pass. They were subsequently located by the X-ray in the right iliac fossa. The patient complained of cramps, and was advised to have the buttons removed by another operation, but he was lost sight of.

Dr. Lilienthal said he was induced to try the McGraw method of gastro-enterostomy in a single instance. In tying the ligature, he tied it as firmly as he could; but the patient's symptoms were apparently unrelieved by the operation, which was an anterior

one. After ten days had elapsed he again opened the wound, and with the exploring finger he could feel the McGraw ligature in its original position. It had apparently not cut through. Another ligature was thereupon placed about an inch distant from the original one, but the patient continued to vomit; and, although two weeks had elapsed, her symptoms were unrelieved. While he was contemplating a third operation the patient suddenly began to improve, and, although the ligature was never found in the stools, he had every reason to believe that the operation proved successful. The patient's vomiting ceased and her general condition improved; but Dr. Lilienthal said that his experience with the McGraw method in this case had proven so unsatisfactory, that he would not resort to it again if he could help it.

Dr. Rogers, in reply to a question, said that a few writers mentioned the possibility of a recurrence of the symptoms after operation for benign stricture of the pylorus, from cicatricial contraction of the operative fistula, and emphasized the importance of narrowing the pyloric outlet. The speaker also said he recently heard of a case of gastro-enterostomy in which the Weir button had dropped back into the stomach, and had to be subsequently removed by operation. The McGraw elastic ligature method, which Dr. Meyer favored, had very few advocates. He did not think it possessed any advantage over the button as a time-saving method, and the reports of failures by this and all two-stage methods were so frequent that at least they could not be considered the methods of choice.

Stated Meeting, December 23, 1903.

The President, Howard Lilienthal, M.D., in the Chair.

ACUTE TRAUMATIC STRANGULATED HERNIA.

Dr. Irving S. Haynes presented a man, aged thirty-eight years, who, in going down an areaway steps, stumbled and fell, striking his left groin against a projecting corner of the stone coping. He was at once seized with an agonizing pain, and his

condition was such that an ambulance was summoned and he was taken to the hospital, where he arrived in a state of almost collapse. Upon examination, a swelling was found over the external ring, and a diagnosis of acute strangulated hernia, of traumatic origin, was made. The House Surgeon was instructed to operate immediately, and upon slitting up the external oblique he found that the hernia had broken through the fibres of the internal oblique and transversalis just above the conjoined tendon. The peritoneum was not ruptured. The hernial sac was opened, and a coil of very dark, œdematous gut was found and reduced.

A further examination revealed a second swelling at the internal ring, and upon slitting up the fascia this proved to be an ordinary congenital hernial sac, for which the usual Bassini operation was done. It was subsequently learned that three years before the man had noticed a small, tender lump in the left groin. He consulted a surgeon regarding it, who told him that he had a hernia, and advised a truss. The hernia did not cause the patient any inconvenience, but soon disappeared, and he did not follow the surgeon's advice.

In reply to a question, Dr. Haynes said there were no symptoms pointing to injury of the cord or testis. The patient made an uneventful recovery and left the hospital on the twelfth day after the operation.

Dr. Bern B. Gallaudet said he thought a sharp distinction should be drawn between the hernia and the sac in so-called traumatic herniæ. In the true traumatic type, of which there are a few on record, there is no hernial sac, the hernia having simply broken through the peritoneum and is found in the tissues of the scrotum without any sac. In the common variety, on the other hand, the sac is present from birth, and the hernia is the result of the trauma.

Dr. Haynes said that the direct hernia, to which he had applied the term traumatic, was through the ruptured muscle. The peritoneum was not ruptured. The second hernia found was of the ordinary congenital type.

TRAUMATIC PYELOPARANEPHRIC CYST.

Dr. Bern B. Gallaudet read a paper with the above title, for which see page 573.

Dr. Brewer said that injuries affecting the kidney region

were always interesting, especially in some of their later manifestations. A very slight injury was sometimes sufficient to produce a rupture of the kidney. The speaker said that the case reported by Dr. Gallaudet reminded him of a rather rare condition to which Morris had called attention, in which rupture of one of the branches of the renal artery was followed by the formation of a hæmatoma, sometimes of enormous size, with a tenacious capsule. The condition Morris described, however, was of very rapid formation, and sometimes disappeared spontaneously.

CYSTIC KIDNEY.

Dr. Parker Syms presented a specimen removed from an extremely neurotic woman, thirty-nine years of age, who had been referred to him with a diagnosis of floating kidney. When Dr. Syms saw the patient in consultation, he found a floating kidney, but it could be readily made out that the organ was not of normal size. It was much enlarged and distinctly lobulated, and very freely movable. The woman was practically an invalid, suffering from the pressure of the kidney on the pelvic organs.

The operation was performed at Stamford, Connecticut, on December 14, Drs. Pierson, Tiffany, and Sherrill assisting.

The incision was made parallel to the twelfth rib, and had to be extended far forward owing to the size of the kidney. When the peritoneum was reached, it was not opened, but was pushed from the wall. An enormously enlarged cystic kidney was found. Apparently there was but little renal tissue left, so the organ was removed, though with some doubt as to the ultimate outcome, on account of the well-known fact that in these cases of cystic kidney both organs are apt to be involved.

Before operation careful examination had been made of the other side, and, though the woman was an extremely thin one, with flaccid abdominal walls, the right kidney could not be palpated, and therefore it was inferred that it was not cystic, or if cystic it was in far better condition than the organ removed.

Before removing the kidney, Dr. Syms and the others debated as to the advisability of opening the peritoneum and passing the hand across the interior of the abdomen to palpate the right kidney, but the woman was so feeble before operation that it was decided best not to subject her to any unnecessary manipulation.

The enormous kidney was delivered and removed; the vessels and ureter being tied separately, the latter being cauterized. The kidney measured seventeen inches in circumference and was made up of a number of cysts. There was apparently a very small area of renal tissue in the region of the pelvis.

The operation was performed December 14. On December 29, a letter from Dr. Pierson reports the patient as having made satisfactory progress, showing that her remaining kidney is performing sufficient function and indicating that the operation was a wise one.

DR. HAYNES said that some years ago he saw a woman, forty-five years old, who was brought to the hospital complaining of a severe pain in the lumbar region. A firm tumor could be felt over the region of the left kidney, which upon operation proved to be one of these cystic kidneys. It was enormously enlarged, and he decided to remove it. The kidney measured nine by four by three and one-half inches. About a fortnight later the woman died of uræmia, and at the autopsy the opposite kidney was also found to be in a cystic condition. The speaker said he thought the consensus of opinion was that these cystic kidneys had better be left alone. In the case he had in mind the remaining kidney was much enlarged, but it could not be palpated at the time of the original operation.

DR. LILIENTHAL said that in view of Dr. Haynes's experience, he would not feel inclined to remove one of these cystic kidneys unless he could feel assured that the opposite kidney was at least fairly normal. Before removing a kidney for any cause, he thought it was a good plan to ascertain the condition of the opposite kidney by incision and palpation. This second incision entailed very slight additional shock, and the speaker said he did not consider it any more dangerous than it was to catheterize the ureter of the opposite kidney in suppurative cases. The latter procedure he disapproved of.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, December 7, 1903.

HENRY R. WHARTON, M.D., in the Chair.

CHOLECYSTOTOMY.

DR. LEWIS W. STEINBACH presented three patients who had been subjected to operation for cholelithiasis.

The first case was a woman, aged forty years, who was admitted to the Polyclinic Hospital, June 17, suffering since one o'clock in the morning with intense abdominal pain, which could not be relieved by hypodermic injections of morphine administered within the limits of safety. There was vomiting, tenderness over upper half of the abdomen, and a slight yellow discoloration of the scleræ. An immediate operation was decided upon. The patient was anæsthetized with ether. A long incision through the abdominal parietes exposed an enlarged, tense gall-bladder, in which no stones were felt until after evacuation of the fluid contents by means of a trocar. The fluid evacuated approximated eight ounces in quantity and resembled normal bile. The neck of the bladder contained three gall-stones, while a fourth was separated by a valve-like partition and was removed with some difficulty, the thumb and forefinger of the right hand steadying the cystic duct while the left hand manipulated forceps or scoop. The stones were globoid with facets, were of almost equal size, each one having about three-fourths of an inch in diameter. A sound was passed into two branches of the hepatic duct and into the common duct without detecting other calculi. In order to verify this condition, a colleague probed the biliary passages and perforated the common bile duct. An elongated gauze pad was placed in contact with the perforation in the com-

mon duct, a large rubber drainage tube was inserted into the distended cystic duct and stitched with the edges of the incision in the gall-bladder to the parietal peritoneum at the lip of the abdominal incision; the sutures were permitted to remain long. Three additional stitches secured the gall-bladder to the peritoneum. The abdominal wall was closed with through-and-through silkworm-gut sutures, except where it was required to leave an open space for the removal of the gauze pad. On the day following the operation, healthy bile in large quantities saturated the dressings; the urine was free from bile pigment. On the ninth day the patient was allowed house diet, on the eleventh day the sutures were removed, and the drainage tube on the twelfth day. Patient was sitting up on July 7. Discharge of bile diminishing gradually, ceased entirely by July 8. Patient is well and comfortable and was discharged as cured on July 23. Observation continued until November. Patient remains free from pain, has no jaundice, gall-bladder cannot be palpated, enjoys excellent health.

The second patient was a woman, thirty-eight years of age, mother of nine living children, who, since the birth of her first child, twenty-one years ago, had suffered at intervals from attacks of pain in the region of the gall-bladder accompanied with jaundice. The attacks at first came at intervals of one or more years, gradually becoming more frequent. For the past three months the attacks came every week and had remained continuous for the past three weeks. Patient takes very little food, has lost much of body weight, and is said to have had obstinate constipation, for the relief of which various purgatives, including croton oil, have been administered by different practitioners. On admission, on August 13, to the Polyclinic Hospital, her temperature was 100.6° F.; pulse, 96; respirations, 24. Decidedly jaundiced. Systolic murmur at apex. Urine is dark reddish-brown, acid, specific gravity 1040, no albumen, no sugar. On August 14, operation under chloroform anæsthesia, the patient being prepared by thorough purging with magnesium sulphate enemata and lavage of the stomach immediately before the operation. Incision about six inches long was made over gall-bladder. Gall-bladder exposed and found adherent to the omentum. Adhesions were ligated and divided. The gall-bladder was aspirated and several ounces of greenish-brown, turbid fluid withdrawn.

About twenty many-faceted stones were removed from the gall-bladder with forceps and scoop, after it had been opened by an incision one and one-half inches long. The gall-bladder was thoroughly washed out. With the finger in the abdomen, several stones were pressed into the gall-bladder from the common and cystic ducts. Irrigator could then be passed into the common and hepatic ducts, which were flushed out, and on probing found free from calculi. In all eighteen large gall-stones one-third of an inch in diameter and nine small ones were removed. A large-sized drainage tube was passed into the gall-bladder and fastened to its edges by a silk suture whose ends were left long. The bladder was stitched to the peritoneum with catgut sutures, cut short, and with one silk suture whose ends were left long. Abdominal incision closed with through-and-through silkworm-gut sutures. Bile discharged freely through the tube into the bottle immediately after the operation, the amount gradually lessening day by day. On the ninth day the sutures were removed and the drainage tube on the tenth. Jaundice disappeared entirely and the urine was free from bile pigment. The patient was discharged on September 3, twenty days after operation, with moderate discharge of bile and mucus. The sinus did not close completely until three weeks later. In October and again in November patient has had an attack of colic accompanied by jaundice.

The third patient was a man, aged forty-four years, who had had during the past three years several attacks of colic, for the relief of which narcotics had to be administered; never marked jaundice. Operation under ether anæsthesia preceded by lavage of the stomach. Long abdominal incision exposed a contracted bladder containing numerous small calculi; the cystic, common, and hepatic ducts likewise filled with biliary gravel. Irrigation of gall-bladder and ducts. The case was treated like the preceding one. The discharge was moderate in amount, greenish mucus, never resembling healthy bile. Drainage tube was withdrawn and reinserted on the fourth day, sutures removed on the ninth day, patient sitting up on the tenth day. On September 8, the gall-bladder was irrigated and three small calculi washed out. Patient was discharged on the nineteenth day after operation, with one abdominal suture remaining and the sinus discharging small quantities of bile-stained mucus. After complete closure

of the orifice, the gall-bladder became distended and palpable. Patient remains well.

It remains to be pointed out that ever so careful a probing and irrigation have failed in two out of three cases to remove all the calculi during the operation. In one instance they passed subsequently through the drainage tube, whilst in the other case they are passing through the cystic or common duct.

RUPTURE OF THE LIGAMENTUM PATELLÆ.

Dr. George G. Ross reported the case of a man, forty years of age, who was admitted to the German Hospital, September 27, 1903, with an injury to the right knee. A wagon toppled over, striking him on the back; he was forced into a kneeling position, the legs being flexed on the thigh and the thigh on the body. He could stand on the right limb after being released from the very uncomfortable position, but could not extend the leg.

On admission there was moderate distention of the joint, pain, and tenderness. There was a separation of about two inches between what was thought to be a fracture of the lower half of the patella. An X-ray negative showed the separation and a deeper shadow at the position of the supposed lower fragment. It was accordingly diagnosed as fracture of the lower end of the patella, the fragment being very small.

On September 30, the joint was laid open by a longitudinal incision and the patella exposed. The patella was found to be intact and uninjured. The ligamentum patellæ was torn completely through about one-half inch below the lower border of the patella. The shadow on the X-ray plate, which was thought to be a fragment of patella, proved to be a small blood-clot.

The torn ends of the ligament, which were badly frayed, were trimmed up and united by kangaroo tendon, the upper loops of the continuous suture including the capsule of the patella. The superficial wound was closed and the limb placed in a plaster case. The patient made an uneventful recovery, and at the present time has a very fair functionating joint. Extension is good, and there seems to be a complete union between the ends of the torn ligament.

Dr. Francis T. Stewart, as illustrating the result that might be secured by sewing together the ends of a divided quadriceps ex-

tensor tendon, mentioned a sailor who had had the tensor severed by a knife thrust. Three months after the injury he was seen by Dr. Stewart, who found the joint distended with fluid and a distinct depression above the patella, the patient being unable to extend the leg. The diagnosis of severed tendon was made, and by an anterior incision the depressed area was exposed. The severed ends of the tendon were found to be separated a distance of four inches in the middle line, this distance gradually diminishing as the muscles at either side were approached. With some difficulty the ends were approximated and sutured with kangaroo tendon. The knee was immobilized for three weeks. The functional result was practically perfect, as the patient was able to resume his occupation and work in the rigging as before the injury was received.

ACUTE INTUSSUSCEPTION OCCURRING AS A COMPLICATION OF TYPHOID FEVER.

Dr. George G. Ross reported the history of a lad, seventeen years of age, of good family and personal history, who was admitted to the German Hospital on the eighth day of an attack of typhoid fever. Temperature ran fairly regular course, although the daily range of temperature was considerable, the difference between highest and lowest for a day being as much as 3° F. The highest recorded temperature was 104 $^{3}/_{5}$° F.

On the twenty-first day he had a blood-stained, liquid stool. Tubbing stopped. On the twenty-fifth day the highest temperature was 102° F., the lowest 101° F. The tub baths had been resumed at patient's request. At 8 P.M., temperature, 101 $^{3}/_{5}$° F.; respiration, 24; pulse, 112. After bath, temperature, 99 $^{3}/_{5}$° F.; respiration, 24; pulse, 104. At 9.40 P.M., hæmorrhage, 120 cubic centimetres. At 11.35, another hæmorrhage, 650 cubic centimetres. Temperature, 99 $^{3}/_{5}$° F.; respiration, 24; pulse, 96.

At 1.30 A.M. of the twenty-sixth day patient awoke with a violent abdominal pain without any particular point of intensity; there was some rigidity of the right rectus muscle. The patient screamed with pain for fifteen minutes, and was only relieved by morphine .01. At 2 A.M., temperature, 98° F.; respiration, 20; pulse, 80. At 4.40 A.M. he had another hæmorrhage, 820 cubic centimetres. Between the time of onset of the pain and 3.30 A.M. there was a slight increase in the abdominal distention. There

was a leucocytosis of 16,000. It was thought that the patient had had a perforation, and the abdomen was accordingly opened without further delay.

Immediately upon opening the peritoneal cavity it was evident that perforation had not occurred, as there was entire absence of gas or fæcal matter. There was no lymph or inflammatory exudate. It was thought wise to make a search of the small intestine. The terminal twenty inches of ileum was moderately distended, and showed the typhoid ulcers and the bleeding points very distinctly through the thin bowel wall. From this point to the duodenum the bowel was completely collapsed. About three feet from the junction of the duodenum and jejunum an intussusception about two and a half to three inches long was discovered; the invagination being from above downward. It was readily reduced and the bowel slowly distended. The sides of the invaginated portion were slightly sticky, and very soon would have become adherent. The peritoneal cavity was filled with salt solution and the abdominal wound closed without drainage. Intravenous transfusion of 1000 cubic centimetres salt solution was given. The patient's temperature remained at 98° F. after operation, rising gradually to 101° F.

On the twenty-seventh day the patient had two hæmorrhages, one of 120 cubic centimetres and one of 250 cubic centimetres.

Temperature normal on the twenty-eighth day.

Thirty-fourth day, temperature normal and the patient's general condition good. He has since made an uneventful recovery.

Dr. W. W. Keen said that the case of intussusception reported by Dr. Ross as occurring during the course of typhoid fever was extremely unusual. No case of the kind was recorded in his book on the "Surgical Complications and Sequels of Typhoid Fever," published in 1898, and covering the results in 1700 cases.

Dr. John B. Deaver said that the case of intussusception showed the importance of operating early in the presence of urgent abdominal symptoms during the course of typhoid fever. Had this case been allowed to continue, obstruction would undoubtedly have occurred, and perhaps made necessary an extensive operation, which in the enfeebled condition of the patient would have been exceedingly dangerous.

Dr. Ross rejoined that during a somewhat extensive search

of the literature he had found intussusception during typhoid fever mentioned in three instances, one in an article on typhoid fever by Dr. J. C. Wilson, in Keating's "Encyclopædia of the Diseases of Children." There the condition was simply mentioned without reference to actual cases. Two cases are on record, one by Ash (*British Medical Journal* for May 3, 1903), in which operation was done and the patient recovered. The second case was reported by Watkins Pitchford in the *British Medical Journal* for September, 1902. In this case the condition occurred during convalescence from typhoid, and was only discovered at the post-mortem. Both of these reports were kindly furnished by Dr. John H. Gibbons.

GANGRENE OF THE SUPERFICIAL FAT OF THE ABDOMINAL WALL, FOLLOWING OPERATION FOR INCARCERATED UMBILICAL HERNIA.

DR. ROSS reported the history of a woman, aged sixty-seven years, and weighing 250 pounds, who had an umbilical hernia of twenty years' standing, which had been irreducible for twenty-four hours before her admission to the Germantown Hospital, October 23, 1903. The abdomen was pendulous and flabby. Bowels had not moved for forty-eight hours, severe crampy pains. Pulse, 104. Tongue moist, coated white. There was a large hernial protrusion about the size of a small melon extending halfway to the symphysis pubis. The covering of the hernia consisted of attenuated skin and peritoneum which had become adherent one to the other. The sac when opened contained a large knuckle of gut and omentum, which was tightly adherent to the inner side of the sac, but had not ulcerated through. The gut was not strangulated, although the fæcal circulation had been cut off. The gut was reduced and the adherent omentum loosened, tied off, and reduced. The sac was removed close to the peritoneal opening, which was closed with kangaroo tendon. The closure was reinforced by lateral flaps of aponeurosis. The wound was closed and rubber drainage introduced, coming out at the lower angle of the wound. The pressure of the sac and its contents had destroyed the fat in the superficial fascia for an area corresponding to the size of the tumor.

The patient was not shocked after operation. The pulse went down to 80 and the temperature to normal. The bowels

moved on the second day, and she vomited but once after ether. Drainage tube was removed on the third day, at which time a foul odor was noticed. The superficial fat was gangrenous. The gangrenous process spread until it involved the entire right side of the abdominal walls down to the loin space. The wound above the tube healed by first intention.

The urine was lost in bed, so that only an estimation of the amount could be arrived at. It was probably above normal. Several specimens examined on different days showed albumen, casts, but no sugar. The patient developed slow coma without delirium, and died in coma. Two days before death a patch of gangrene developed on the right thigh just below Poupart's ligament.

The operation wound had healed by primary union, and had not become involved in the gangrenous process, which had been confined to the superficial fat, not involving the aponeurosis below or the skin above.

In spite of the absence of sugar in the urine, he believed that diabetes was the determining factor in the patient's death.

JACKSONIAN EPILEPSY; TREPHINING; RECOVERY.

DR. W. BARTON HOPKINS reported this case, stating that he did so for two reasons: First, because it added one more to the list of epilepsies cured, at least temporarily, by the operation of trephining alone, in which no discoverable lesion had been found to exist; and, second, because he had employed for the first time on a living subject the trephine which he had devised and previously demonstrated on the cadaver before the Academy.

T. T., a man, aged twenty-one years, born in Italy, came to the Pennsylvania Hospital, July 15, 1903, with the following history. Was naturally healthy until three years ago, when he became epileptic. The condition was attributed to fright; while being lowered into a well he was suddenly impressed with a dread that he would fall, and became very much alarmed. About one week afterwards he had his first convulsion. At first these were occasional, but gradually increased in frequency, until of late he has had three or four a day. On admission appears a healthy, well-nourished individual, of fair intelligence; examination of his urine, eye-grounds, chest, and abdomen are negative. On the day of his admission he had three seizures, and during the night two. One of the latter was described by the nurse as beginning

in the left upper extremity and involving the upper part of the body; was accompanied by unconsciousness, and during the attack the patient was very violent. During one of the seizures there was observed clonic movement at the elbow; then the head rotated to the left and the eyeballs turned upward and to the left. There were also some general bodily movements and apparently unconsciousness. There was no bleeding at the mouth. This seizure lasted about five minutes, at the end of which time the left arm was still twitching. Before recovering from the convulsion another similar one occurred, followed by still a third. The three seizures occupied about twenty minutes. The left arm was very painful afterwards. The nurse reported numerous convulsions up to midnight, when he was given a large dose of bromide of sodium, after which he slept.

The following observations were made by Dr. Charles K. Mills, who kindly saw the patient: Left upper extremity, some weakness in grip of hand and in special movements, as of little finger and thumb. Awkwardness with movement of left hand and fingers, especially with eyes closed, but all movements retained, all forms of sensation retained, response to touch prompt, but to pain and temperature diminished and retarded. Asteriognosis of the left hand present, but not absolute; recognizes common objects, such as a knife, a coin or a key, by feeling them with his eyes closed, more promptly with the right hand and sometimes not at all with the left. Sensation similarly affected in the left lower extremity. There is no facial paralysis, no paralysis of the proximal portion of the arm and none of the lower extremities. Knee-jerk present on both sides; no plantar cutaneous reflex on the left except tarsal response at first. This latter may have been involuntary; tarsal and metatarsal responses on the right probably voluntary. No ankle clonus. Deep reflexes present in the upper extremities, probably more marked on the right.

July 23 the patient was anæsthetized with anæsthol. The topographical lines were carefully pencilled with aniline, and a point for the centre of a three-inch flap was located about three-quarters of an inch posterior to the middle of the right Rolandic fissure. The time required in cutting and reflecting back the osteoplastic flap, after adjustment of the instrument, was six minutes. A good exposure of the dura mater was thus obtained.

The latter appeared perfectly healthy; pulsation was apparent to view and touch, and there was no abnormal tension. The dura was freely opened by a crucial incision, and a probe was inserted at one point into the cortex. A flat probe was also carefully insinuated between the brain and dura beneath the peripheral opening in the skull. No diseased area nor tumor being detected, the flap was replaced and the scalp approximated with a continuous catgut suture. The patient's condition was good throughout. The next day he had a slight convulsion, but otherwise was in satisfactory condition, and the grip of the left hand was found to have become very much stronger. His recovery from the operation was uneventful. Three weeks later, August 14, 1903, he was discharged from the hospital cured, the final note being made that his general condition was excellent; that he still complained of curious feelings on the palmar surface of the left wrist; that there was no anæsthesia of the hand, no asteriognosis, as tested with a knife and watch, and the grip of the left hand, which before the operation was very feeble, was about as strong as on the opposite side. Has been quite free from convulsions since the day after the operation. The patient, seen a month after his discharge, appeared to be in perfect health.

PANCREATIC CARCINOMA; GASTRO-ENTEROSTOMY; PECULIAR COURSE OF THE DUODENUM AND JEJUNUM.

Dr. De Forest Willard reported the history of a woman, aged fifty-six years, who was admitted to the Medical Ward of the Presbyterian Hospital, October, 1903, under the care of Dr. Stryker, with a history of indigestion for two years. She presented marked emaciation and deep jaundice, with increasing loss of flesh for last two months; loss probably twenty-five pounds. Continuous pain at and below epigastrium for four months; vomiting persistent; bowels constipated; fæces contain fat.

Diagnosis.—Cancer, probably of pancreas; possibly involving stomach or gall-bladder. She was transferred to Surgical Ward for exploration and possible gastro-enterostomy, in order to drain the stomach. She was in exceedingly low condition, deeply jaundiced.

On examination, large, dense, nodulated masses were plainly palpable between the epigastrium and the umbilicus, extending

along the spinal column nearly to the bifurcation of the aorta, and upward to the stomach; also extending across to the right in the direction of the gall-bladder. Aortic pulsations imparted to tumor. Left lobe of the liver not enlarged, but the liver is discoverable below the ribs. To the right was a smooth tumor of shape and feeling of an enlarged gall-bladder. Has vomited blood, dark in color. Has also sugar in the urine to the extent of 1.63 per cent.; also bile pigments, albumen, and granular casts; fæces contain fat. The temperature was subnormal. Pain was very severe and the exhaustion great. There was no history of the violent attacks such as are found in cholelithiasis of the common duct.

Upon palpation the liver could be discovered below the ribs, but nodules could not be felt on its under surface. The gastric symptoms were not as positive as is usually the case in stomach cancer; there was less vomiting of blood. The absence of the pancreatic secretion from the intestines was not tested by giving salol and noting the absence or presence of its products carbolic and salicylic acids in the urine: salol under normal conditions should be decomposed into these two substances in the duodenum. Examination of the gastric contents showed free HCl present; total free HCl, 16; total acidity, 28; erythrodextrin present; microscopic examination, starch.

Operation, October, 1903. Patient's condition very unfavorable; within fifteen minutes from beginning of operation pulse became unrecognizable at wrist. Patient in collapse throughout nearly whole time; salt solution, hypodermoclysis, oxygen, stimulants, etc., freely used. Upon opening the abdomen, dense nodules occupying the site of the pancreas were reached. These nodules filled the curve of the duodenum, extended across to the left beyond the spinal column, and up and down the spine. Pylorus not involved. Liver free and normal. Gall-bladder greatly distended. The duodenum could be traced from the pylorus through the first three inches, then it disappeared behind the cancerous mass and could not be reached. On lifting the omentum, large dense masses were found adherent to the posterior part of the omentum, and, as the duodenum could not be reached nor the first part of the jejunum, a loop of bowel was caught and a posterior gastro-enterostomy done with a Murphy button, as the most rapid method. Patient's condition forebade any additional

entero-enterostomy. The gall-bladder, the size of a small orange, was sutured to the abdominal wall and drained through a second opening. Several ounces of very dark green, thin bile were secured, with four small dark gall-stones. No stones found in ducts. In spite of saline injections and stimulation of all kinds, the patient only rallied slightly, and died the night after operation.

At autopsy the duodenum and the first part of the jejunum were entirely lost behind the cancerous pancreas. Upon reflecting the great omentum the under surface was found adherent to the upper surface of the mesentery, still further concealing the course of the upper intestine. A probe could be passed through the cystic and common ducts into the duodenum, meeting no obstruction. The dilated gall-bladder and changes evidently had been due to pressure upon the duct. The infiltrated glands extended up the spinal column as far as the diaphragm. The left kidney showed secondary carcinoma deposits; liver and right kidney free.

Pathological Diagnosis.—Primary carcinoma of pancreas with metastases to the mesenteric, retroperitoneal, and peripancreatic lymphatic glands; also of the left kidney. Pressure on the duodenum and common bile duct; carcinomatous adhesions between the great omentum and mesentery enclosing transverse portion of the duodenum.

Dr. J. Dutton Steele, Pathologist, reports as follows: "Carcinoma of pancreas; the organ considerably sclerosed, with atrophy of the secreting glandular tissue; cancer nests infiltrating the newly formed connective tissue. Sclerosis does not affect the islands of Langerhans, and they are quite numerous in proportion to the glandular epithelium. Cancer evidently of glandular origin. The kidney shows secondary deposits; the acute parenchymatous degeneration or cloudy swelling as seen in cases of intoxication in poison and in malignant disease."

Dr. Willard remarked that these tumors of the pancreas may sometimes be reached by dividing the gastrocolic omentum below the greater curvature, where the tumor may be covered by the posterior layer of the lesser sac, or they may be reached by turning up the omentum and tearing through the transverse mesocolon into the lesser sac; as they usually push the transverse colon downward, it is sometimes necessary to pass through both layers of peritoneum forming the greater omentum, together with the posterior layer of the peritoneum of the lesser omentum.

A dozen or more cases of attempted removals of cancer of the pancreas have been reported by Robson and Moynihan in their work on "Diseases of the Pancreas." Portions of the gland have certainly been safely taken away in some cases, and in one or two instances it is said the whole gland; but this procedure seems doubtful, especially when one considers the close relations of the large splenic, superior pancreaticoduodenal branches from the hepatic, and the inferior pancreaticoduodenal branches of the mesenteric. The hæmorrhage from any one of these vessels in the already weakened condition of these patients would be a serious matter. Directly behind the head also lies the inferior vena cava, the left renal vein and the aorta, to which vessels adhesions might have been contracted, while the tail of the organ is in intimate relation with the spleen and with the duodenojejunal flexure.

SPINA BIFIDA, WITH ANTERIOR OPENING, FORMING ABDOMINAL CYST.

Dr. De Forest Willard presented a female Italian child, who at his first examination, when the child was two months old, presented a dorsal tumor the size of a small orange, which occupied the whole lumbar region. It was covered by normal skin; was semifluctuating in character, but was too dense to permit accurate information as to an opening into the spinal column. The impression imparted to the hand was that of a lipoma, with an underlying spinal cyst. Pressure upon the mass did not give the child pain nor apparent cerebral distress. It was rendered somewhat tense in crying, but the child was apparently in no pain and did not cry out when handled. The right half of the abdomen and flank were filled with a large semiliquid tumor, giving the impression of a sarcoma of the kidney. The child does not use its lower limbs. The baby at present is four months old, and observation for the last two months does not reveal any perceptible increase in either tumor, and the child is thriving, thus rendering the diagnosis of sarcoma improbable.

The abdominal tumor bulges on coughing; is tympanitic in points, as though the colon was pushed forward, but with the possibility of it being an anterior spina bifida. Tapping it has not been resorted to, and the condition is so uncertain that he had preferred to delay operative measures upon either posterior or

FIG. 1.

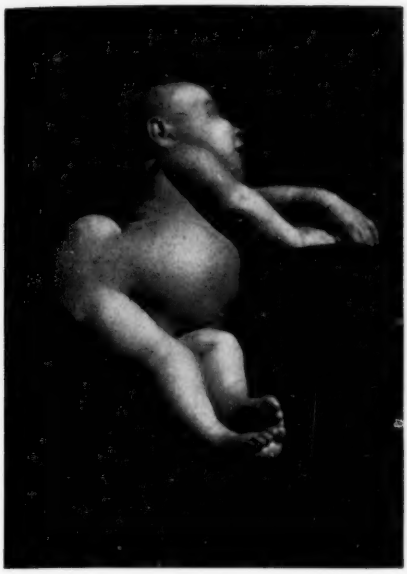


FIG. 2.

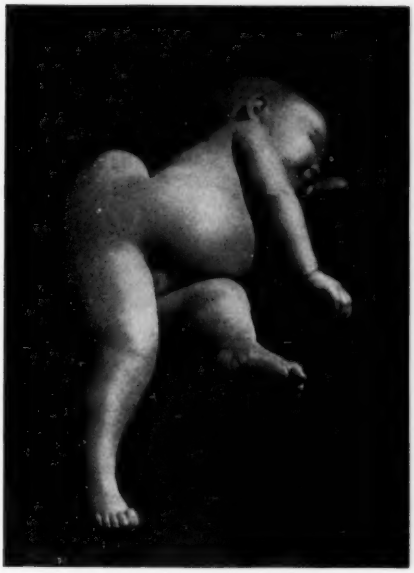


FIG. 3.

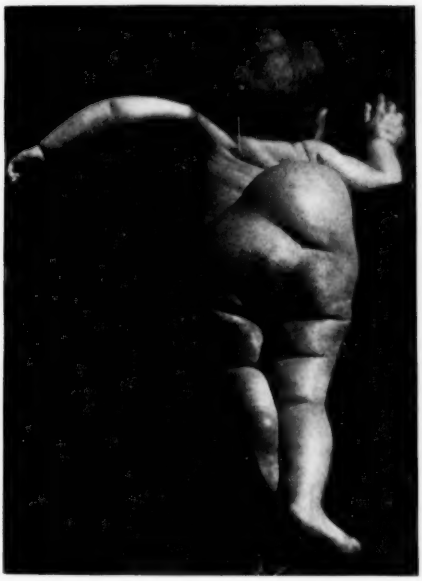
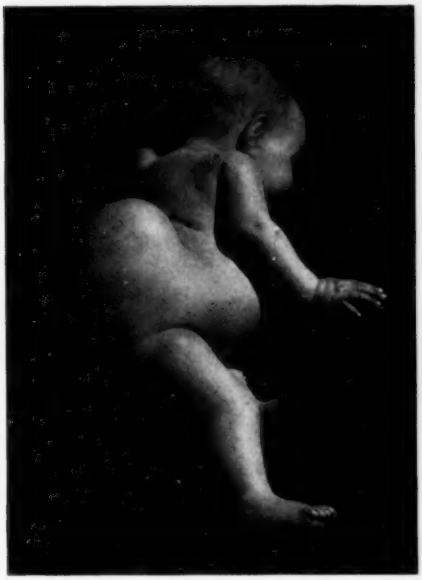


FIG. 4.



Spina bifida, posterior and anterior.

FIG. 5.—Skiagraph of case of spina bifida, posterior and anterior.

anterior tumors until the diagnosis was more sure, and until the child should be older.

The dense shadow in the tumor, as seen in the skiagraph, denser even than the bones of the spinal column or pelvis, renders the condition a puzzling one. The tumor might be a teratoma containing fœtal remains.[1]

Spina bifida anterior is a very rare condition.[2] Robinson[3] states that there is no clinical record of a similar experience to his own; but Emmett[4] reports such a tumor diagnosed as an ovarian cyst in a woman of thirty-six years, which cyst extended into the pelvis, filled up the curve of the sacrum, and was aspirated through the rectum. The woman died on the seventh day. The cyst contained three quarts of fluid, and was found to be connected through the three lower sacral bones with the spinal canal.

In Robinson's case of a child of eleven months old with club-feet, there is no record of a posterior tumor; but the right side of the abdomen was occupied by a large tumor, which received an impulse on straining; the cutaneous veins were enlarged. The fingers could be dipped between the costal margin and the cyst. The diagnosis was that of a parovarian or broad ligament cyst, or some fœtal remnant. Celiotomy was done at the right of the median line. A pint of fluid was removed from a thin-walled cyst, and a finger inserted into the cyst passed into an opening into the spinal column. The sac was ligatured close to the spine with silk and cut away. No nerves were found in the sac. The fluid was colorless; specific gravity, 1002; alkaline reaction; contained a trace of proteid and some chlorides. The child lived ten days. Temperature persistently high. Five days after operation the anterior fontanelle was fuller. No tetanic contractions in hands or arms. At the post-mortem an extensive defect at the right side of the last dorsal and of the lumbar vertebræ was discovered. The pedicles of the transverse processes of these vertebræ were absent; the bodies of the vertebræ were

[1] International Encyclopædia of Surgery, Ashhurst, Vol. iv, pp. 902–905.

[2] Willard. International Encyclopædia of Surgery, Ashhurst, Vol. vii, Supplement, p. 653, 1895.

[3] Medical Press and Circular, London, p. 477, 1903. Transactions of Clinical Society, London, 1903.

[4] American Journal of Obstetrics, 1871, p. 623.

irregular and fused. The two lumbar had a very poorly formed ossific nucleus on its right half; the third had no ossific nucleus on the right side. The spine was curved laterally, concavity to the left. There was a marked dilatation of the central canal of the cord.

One other case is found in the Royal College of Surgeons Museum,[5] but there is no clinical record attached. In this case there is a marked defect on the left side of the last lumbar vertebræ; but the case is probably one of posterior rather than anterior tumor.

Bryant[6] reports a case of a woman aged twenty-five years dying from an accident, who presented an anterior spina bifida.

Jacobi[7] reports operation upon a supposed lipoma in the lumbar region of a child four months old, which at birth presented a tumor the size of an English walnut. It grew rapidly, however, and at the operation, after cutting through one and three-quarter inches of fat, a spinal sac the size of a thimble was found connecting with the two lower lumbar vertebræ. The child died in convulsions in forty hours.

Johnson[8] reports a recovery from an excision of a fatty tumor overlying a spina bifida.

Dr. John B. Deaver said he believed the case to be one of spina bifida. Both tumors contain fluid, as fluctuation can be elicited in each. Both posterior and anterior are in connection with the spinal canal. The paraplegia as well as the anterior tumor especially increasing in size when child cries favor this diagnosis.

Dr. William L. Rodman believed the tumor on the sacrum to be a combination of lipoma and spina bifida. This is not a rare condition. Dr. Willard exhibited another such case to this Academy a year ago, and Dr. Rodman has seen several such cases. Bland-Sutton has particularly called attention to this condition. The anterior tumor is of doubtful nature. It is possible that the posterior one has become cut off from the spinal canal

[5] Clinical Society, London, Spina Bifida Reports, Vol. xviii, pp. 358, 359.

[6] London Pathological Society Transactions, Vol. ii, 1860, p. 299.

[7] American Journal of Obstetrics, 1871, 631.

[8] Transactions of Pathological Society, London, Vol. viii, p. 16.

by closure of its communication and the fluid is going anteriorly. This seems to be a rational explanation of the situation, but the anterior tumor is tympanitic. The presence of coils of intestine might be in part responsible for this tympany, yet there seems more than would come from these and a moderately distended cyst. Another possibility in this case is that it may be one of lumbar hernia presenting in Petit's triangle. Spina bifida is usually accompanied by other developmental faults, such as hernia, talipes, hydrocephalus, etc. Dr. Rodman was quite sure that the condition is not one of sarcoma of the kidney.

LIVER ABSCESS FOLLOWING AMŒBIC DYSENTERY; DRAINAGE THROUGH GASTROHEPATIC SPACE.

Dr. De Forest Willard reported the history of a woman, sixty years of age, who in August, 1903, in the midst of good health, and without having visited the tropics, was seized at Atlantic City, New Jersey, with pain, mucous stools without blood; passages eight or ten daily; temperature as high as 104° F. Soreness on pressure continually present. Amœba found in stools. She was seen in consultation with Dr. Musser late in September suffering with great pain over the region of the liver, with tenderness on pressure. Below and to the right of the epigastrium was a tender, semifluctuating tumor, visible to the eye. There was slight jaundice with continuous bowel pain and vomiting. Hæmoglobin, 60 per cent.; red blood-corpuscles, 2,745,000; leucocytes, 22,000.

On account of danger of rupture into the peritoneal cavity, immediate operation advised, which was done September 29, 1903. (At the operation he was fortunate enough to have the assistance and counsel of Dr. W. J. Mayo.)

Upon opening the peritoneum no adhesions were found between the two layers. The edge of the liver was plainly seen, but there were no signs of protruding abscess upon either upper or lower surfaces. Beneath the liver, in the gastrohepatic space, was a large elastic tumor, suggesting cyst of the pancreas. After circumferential packing had been introduced, a half-pint of greenish-yellow fluid was evacuated, thin in consistency at first, later thicker and more glutinous; finally, masses of dark, broken-down liver tissue and partially organized coagula were discharged. In the cavity was a large ragged mass of firm consistency, which

it was deemed unwise to detach with the fingers lest hæmorrhage be started. The walls of the abscess were stitched with catgut to the aponeurosis, and a large rubber drainage tube inserted to the bottom of the cavity, together with a strip of gauze.

Laboratory examination. Fluid from amœbic patient. Specific gravity 1002; albumen, $4^{4}/_{10}$ per cent.; clear green fluid; no pancreatic ferments; no change in milk, and no production of peptone in alkaline media. Microscopical examination. No pus; few fat droplets and granular débris; no bacteria. Culture in agar (plate), sterile; no growth. Necrotic tissue, apparently old blood-clot, containing no amœba and no bacteria. The fluid proved to be sterile; did not respond to the tests for pancreatic juice, while it was also negative as regards bile tests. The hardened masses removed showed broken-down blood-corpusles, etc.

As the patient vomited on fourth day, the packing was removed, lest its pressure upon the stomach might act as an irritant. The drainage from the cavity was left undisturbed. The peritoneal cavity was quickly blocked off and never became infected. The masses within the sac separated and came away as slough. Drainage continued for weeks from the cavity, which was six inches deep from the surface, but which slowly granulated.

October 4, 1903. Agglutination test with bacillus of dysentery in dilution, 1 to 20; negative. In dilution, 1 to 50; negative. Gastric contents, total amount, 58 cubic centimetres. Total free HCl, 0.4 cubic centimetre. $^{n}/_{10}$ NaOH Sol. 0.014584 per cent. Lactic acid absent. Microscopic fat globules abundant; starch granules few; sarcinæ absent; Oppler Boas bacilli negative.

October 5, 1903. Hæmoglobin, 75 per cent.; red blood-corpuscles, 4,238,000; leucocytes, 14,900. Gauze dressings suggestive of biliary elements; staphylococcus pyogenes albus.

October 30, 1903. Amœba coli present in the abdominal discharge and in stools.

The varying conditions of the presence or absence of amœba agree with the statement of Kieffer (*Philadelphia Medical Journal*, February 21 and 28, 1903) in his excellent lectures on "Tropical Abscess of the Liver."

TRANSACTIONS

OF THE

CHICAGO SURGICAL SOCIETY.

Joint Meeting with the Chicago Medical Society, held January 13, 1904.

The President, E. WYLLYS ANDREWS, in the Chair.

THE SURGICAL TREATMENT OF BRIGHT'S DISEASE.

DR. E. WYLLYS ANDREWS reported four cases, as follows: First, a man, thirty-two years of age, in moderate health otherwise, who had had for some years chronic interstitial nephritis. His urea averaged about $^{7}/_{10}$ per cent. There were hyaline casts. Double decapsulation was performed, following which there was a decided improvement in the total amount of urine as well as the total solids, and for a period of two or three weeks thereafter the urea went above 1 per cent., and remained between 1 and 2 per cent., while the casts were about the same. There was a small amount of albumen. The subsequent history was that the urea was again reduced. There were two or threescore careful urinalyses made of twenty-four hour specimens. The case was watched carefully, and to the best of his knowledge, nearly eighteen months after the operation, there was very little change for the better, nor yet was the patient much worse.

The second case was a young man, twenty-seven years of age, in comparatively good health. A patient of Dr. Johnson. Careful urinalyses showed that he had constantly averaged only ½ per cent. urea; moderate amount of casts, and had chronic interstitial nephritis. Last May or June he decapsulated the kidneys, and, as in the first case, a very promising result appeared to be obtained at first. The urea line went up above 1 per cent., sometimes 2 per cent., and stood there for a little while; but the speaker was much disappointed to learn some months afterwards

that patient's urea had dropped again to the old per cent. The man had been six months before, and six or eight months after, the operation constantly on the strictest diet. While the patient reported himself as robust and feeling well, as a matter of fact his urinary findings were about the same.

Case three was under the charge of Dr. Goodkind and Dr. Hunt, of Englewood. A child, nine years of age, had severe, well-advanced chronic parenchymatous nephritis. The patient had been watched for some years; the symptoms had slowly but progressively grown worse. Anasarca was extreme; his eyes, forehead, neck, and chest were markedly œdematous as well as the lower limbs. Albumen varied from ½ to 2½ per cent.; urine rather scanty, and the case was apparently a desperate one, although there was never any bad heart action, or there had never been any coma. The child's condition precluded general anæsthesia with ether or chloroform. Under spinal cocainization, however, he had no difficulty whatever in making the decapsulation. The operation was done in September. A slightly favorable influence was at first apparent; the albumen diminished in quantity, remaining at about 1 per cent.; casts remained numerous; urea was fairly good; there was never at any time the slightest improvement in the anasarca. Patient remained in the hospital three or four weeks, then went home. After the fourth week the albumen again increased in quantity. After five weeks the patient had the former amount of albumen and, if anything, a smaller quantity of urine. He was dropsical and could hardly be moved. He considered it a case not improved by the method.

In case four the operation was done two months ago. It was a mixed case of intermittent hydronephrosis and unilateral nephritis. There was relief from all of the kidney symptoms by combined nephropexy and complete decortication of one kidney. Formerly, the urine was frequently full of blood, with a good many casts in the urine. There was intermittent distention and pain, and albuminuria, all of which symptoms had been entirely relieved; but he should say that it was likely the nephropexy, and not the decortication, that did the work.

Dr. L. L. McArthur reported the following case of double decapsulation of kidney in a woman aged twenty-five years.

During an attack of pleurisy in August, 1901, she was found

to be suffering from nephritis. Ever since she has been under rigid medical care by Dr. Favill, and has had full benefit of diet, hygiene, and change of climate. She was referred to Dr. L. L. McArthur, for surgical treatment, in September, 1902, complaining of pain in back of head, œdema about eyes, ankles, and hands, infrequent urination (at times but once in two days), loss of appetite, strength, and weight, and attacks of drowsiness.

She had œdema of face about eyes of moderate degree; also about ankles and hands. Some pallor and "looked" weak and sick. No abnormal retinal findings. Condition of urine, color, straw; reaction, acid; sp. gr. 1007–1014; sediment, small amount; amount in twenty-four hours, 750–1700 cubic centimetres. (Amount due to large amount of water ingested; average, 1080. Much less (twenty ounces) before water was crowded;) total solids, 16.3 to 26.7; urea, 1 to 2.4 per cent.; albumen, .1 to 1.2 per cent.; sugar, 0; pus, few to much; blood 0 to few; cells, many epithelial; crystals, few calcium oxalate, urates; casts, few granular, few hyaline. (Only one specimen had none.)

September 29, 1902. Decapsulation of right kidney was done through an oblique lumbar incision. The capsule was somewhat adherent and the kidney slightly contracted. Capsule divided transversely, and then the lower and upper poles were respectively delivered, so that the whole capsule was placed anterior and internal to the kidney, and acted as a shelf upon which the kidney rested. The lower half capsule was stitched to fascia of transversalis at edge of wound by three catgut sutures. Temporary small drainage tube down to kidney. Recovery from operation was uneventful.

Segregation after first operation showed:

1. Amount of urine always more (one exception) from right kidney. 2. Urea, in three analyses, more from right side; in two analyses same amount from both sides; in two analyses less than in left side. 3. Albumen, in four analyses much more from left kidney; in two analyses same from both sides. 4. Casts, in one analysis no casts from right, few granular from left; in one analysis no casts from either side; in one analysis few granular right, few granular left; no hyaline right, few hyaline left; in one analysis one granular right, few granular left; one pus right, casts left.

General condition after right kidney had been operated upon: Decreased pain; no œdema; larger amount of urine; appetite still poor; some increase in strength.

Urine analyses before first operation compared with analysis after both kidneys had been decorticated.

Before (Nine Analyses).	*After (Ten Analyses).*
Specific gravity, 1007 to 1014.	Average, 1011.
* Amount in twenty-four hours, average, 1080 cubic centimetres.	Average, 1187 (1320 to 1800 last six months).
Total solids, 16.31 to 26.7 grammes.	Risen to 36 grammes last six months.
Urea, average, 1.45 per cent.	Average, 1.42 per cent.
Albumen, average, .4 per cent.	Whole average, 1.6 grammes; but when not including two examinations in February, which were 3.2 and 4.0, average was 1.02 grammes.
Sugar, 0.	0.
Pus, few to much.	Very few.
Blood, 0 to few.	Few to 0.
Cells, many epithelial.	Still many, at times few.
Crystals, 0 to few oxalate.	Amorphous few.
Casts, always some granular, usually few. Few or considerable hyaline.	Have diminished from few granules and many hyaline to 1 granule and 4 hyaline in three specimens during last six months.

January 1, 1903. The left kidney was decorticated at the urgent request of patient. Same technique. Appearance of kidney negative. Left hospital, March 5, 1903.

Comparative analysis of symptoms:

Before Operation.	*To-day.*
Pain in back and head at times severe.	No pain.
Œdema of face and eyes, ankles and hands.	No œdema. (Rarely slight above eyes.)
Loss of weight.	Some gain in weight.
Great loss of strength.	Great gain in strength.
At times would urinate but once a day or day and a half; total 20 ounces or less.	Urinates five or six times during day, 60 ounces last twenty-four hours.

* Much less before entering hospital, where liquids were abundantly crowded.

Before Operation.	*To-day.*
Drowsiness at times marked.	No drowsiness.
Very tired upon the least exertion.	Exercises freely and feels "perfectly well."
Appetite very poor.	Appetite good. (Still on a diet of no meats.)
	"I am perfectly well now, and wish to go back to my work."

NOTE.—Cardiovascular changes as to blood-pressure, etc., not accurately enough noted to draw conclusions.

Final Conclusions applying to this Case.—(1) General condition much improved since operative interference. The element of time and two periods of absolute rest in bed for two weeks each must be considered here as possible causative factors; while on the other hand, be it noted, the patient for over a year before operations was under excellent medical care and given full benefit of diet, hygiene, and change of climate.

(2) Distinct improvement in the quality and quantity of the urine secreted from the kidney first operated upon as compared with the unoperated kidney.

(3) Improvement in quality and quantity of urine from both kidneys since the operation.

DR. A. J. OCHSNER said we must look upon cases of nephritis as forming two distinct classes which had nothing to do with each other, so far as the disease itself was concerned, with the exception of certain symptoms. In the one class we had healthy kidneys, one of which had been injured mechanically, and this injury having been corrected by fixation and decapsulation, the kidney itself contained the elements which were necessary for its recovery. This class was discussed by Edebohls in his first paper.

In the other class, with systemic cause or causes, the conditions were entirely different. The element of tension might depend upon a further condition which was not mentioned, namely, œdema of the kidney. Tension in these kidneys was increased to a great extent in advanced cases by the œdematous condition of the kidney itself, and after relieving tension there was at once a flow of œdematous fluid precisely the same as was found in cutting through the remaining œdematous tissues. Having relieved the œdema, it was easy to imagine that the kidney tissues would be relieved of a certain burden, and the tissues which were prac-

tically inactive before would become active again, in a measure, for a short period. But these kidneys did not possess the conditions which were necessary for permanent recovery.

He had operated on a large number of movable kidneys in which there had been an injury due to displacement, interference with the circulation and traumatism, which accompanied this condition in which he removed a portion of the capsule for the purpose of securing proper fixation. He believed that these kidneys need not be considered, because the results, so far as nephritis was concerned, were simply incidental. The patient would live probably nearly as long, if not quite as long, with the use of one good kidney, the injury to the movable kidney being of slight importance.

As regards patients suffering from advanced nephritis, he had operated on seven cases, all but one of which seemed hopeless. All but one of these had well-marked albuminuric retinitis. One of these was a man, fifty-one years of age, an alcoholic, with a tremendous general œdema, and having all of the symptoms of advanced interstitial nephritis. He operated upon him August 3, 1903. Patient had been comatose a portion of the time for several days. He had been under careful medical treatment during a period of six months. The six weeks before the operation were spent under observation and treatment in the hospital. The œdema disappeared completely and the patient improved to a marked degree. The amount of urine increased from an average of fourteen ounces in twenty-four hours to over sixty ounces. The cause of his nephritis was chronic alcoholism. Patient was still alive; he had resumed his habits as regards the use of alcohol, and was now suffering from a mild form of mania. He thought he would die soon. There was one case which corresponded closely to the one Dr. McArthur had described, the patient being only thirty-six years of age. She was operated on June 26, 1903, and at the present time patient claimed to be perfectly well. Four out of seven had died within one year after the operation, one of them within two weeks. One improved materially after operation upon one kidney, and expressed a desire to have the other kidney operated on; but he died in seven days from acute uræmia. Three were alive, one of them having been operated on only a few weeks ago.

Dr. Alexander Hugh Ferguson said that in the milder

cases of nephritis the results of decapsulation were beautiful, both immediate and permanent.

Surgeons, however, had been forced to operate on many severe cases since this surgical procedure had been devised. Cases that were moribund were bound to die inside of a few days or weeks; they slipped away from the internists, who could not do anything more for them. Decapsulation, he thought, had more effect upon patients than internal medication. However, he would say that the limitations of decortication of the kidney were not yet clearly defined. At the present time, with an experience of over twenty operated cases, he would put down the indications for surgical intervention in Bright's disease as follows: Independently of this, he would decapsulate all cases of floating kidney, and suspend such a kidney from the peeled-off capsule. The reason for this being that in a number of cases that had been under observation for years there had been no kidney disturbance other than that the kidney might be movable, and after a time the kidney became painful and tender, with symptoms of Bright's disease, as indicated by the condition of the urine. He had made inquiries of thirteen different such cases he had on his books, extending over a period of years, and of this number that were operated upon for kidney disturbances since they had been his patients, all but three had undergone nephropexy, pointing out the fact that the kidney having once lost its moorings, interference with the circulation thereby produced a low form of inflammation in the kidney, which called for surgical treatment. He had years ago refused to operate upon cases of floating kidneys because there was Bright's disease as well. Now, it was an indication for operating. An indication would be for nephritis itself. The first of these would be acute Bright's disease of whatever form, where it stubbornly refused management, as in those cases attacked by Reginald Harrison for the relief of kidney tension. Although Harrison had operated on some of them under mistaken diagnoses, still the lesson was taught the profession that acute Bright's disease was amenable to surgical treatment. We might have the diffuse, interstitial, and parenchymatous forms of acute Bright's disease. One could not in a given case tell, without microscopic examination, how much was parenchymatous, how much was interstitial, and how much was diffuse. Cases of chronic interstitial nephritis, in which the kidneys were extremely painful and tender, though

small, were benefited for a time, at least, by decapsulation and puncture. It could not be said that peeling off of the capsule of the kidney was going to cure general arteriosclerosis, but it might affect the sclerosis in that kidney. Parenchymatous nephritis was a form, he thought at one time, which would receive no benefit by operation, but he was convinced to the contrary in properly selected cases. He mentioned three extreme cases showing the limitations of the operation.

Last June he was called to Wheaton, Illinois, to see a man, fifty-six years of age, who had been ill for twenty days. He went to Wisconsin on a business trip, took cold in driving through the country; his urine became bloody; he returned in three days, and placed himself under his physician. Several months before this illness the patient's urine was examined repeatedly at the Columbus Medical Laboratory without finding evidence of Bright's disease. It was also examined by a physician who had examined the man for life insurance. Dr. Rea examined his urine several times, and he could not find any evidence of Bright's disease. For six days before he had only passed eight ounces of urine. He had been perspiring profusely. He had œdema of the lungs, bloated face, was drowsy, and one would have to arouse him before he would answer questions. It was an extreme case, one which he thought ought not to be operated upon. He consented to explore one kidney under local anæsthesia. He used cocaine; explored the right kidney, and found, when he began to handle the kidney, it caused pain. A little chloroform was given the patient as an analgesic rather than for the purpose of putting him profoundly asleep. In peeling off the capsule, the first appearance of such a kidney was its dark-blue color, and blistered. The capsule was completely raised off over two-thirds of the kidney. There was bloody serum underneath. The capsule peeled off readily. The kidney itself was hard, mottled, and friable. This was a case, as shown by a microscopic examination of a portion of the kidney, of acute, diffuse, hæmorrhagic nephritis engrafted upon an old interstitial Bright's disease. If this case had been operated on early, he believed life would have been spared for some time. He died of pulmonary œdema in sixteen hours.

The next case was one of double decapsulation of the kidney, the operation having been performed November 23 last. Patient was a week in the hospital before the operation. He had ad-

vanced interstitial nephritis. This patient had marked headache, œdema of the face, arms, and legs. The urine, sp. gr. 1007, was loaded with granular and hyaline casts; albumen, 36 per cent.; urea, ¾ of 1 per cent., with pus coming from the bladder and prostate. He had coma two weeks before the operation, and he was unconscious for three or four hours. After the operation the clinical picture in this case was changed completely. Instead of being stupid, drowsy, bloated, œdematous, and a half-living man, he appeared to be wide awake, sprightly, and walked into the clinic, three weeks afterwards, with the record of his case under his arm to show himself. When the speaker saw the patient three weeks ago he was improving constitutionally. There was not much change in the urine, with the exception that there was less albumen; granular casts were present and were as abundant as before. The quantity of urine was somewhat less, but not sufficient to say much about it. The fundus of each eye was extremely congested before operation, so that he could not distinguish his relatives from the nurse. He could not see to read at all. In a few days vision had improved amazingly. He discarded his spectacles and could read readily and well. What the permanent benefit would be in this case he did not know.

Another patient had had Bright's disease. He had scarlet fever twelve years previously, and Bright's disease was only diagnosed by a physician about nine months ago. He told patient that his case was hopeless. Patient was passing very little urine. He had general œdema. A rapid operation was done, and two white kidneys about the size of an egg were found. In cutting into them they did not bleed; it was just like cutting into a piece of cheese. Nothing surgically could be done which would be of benefit in these cases of small white kidney.

He operated upon a woman on the 9th of September, 1897, who was referred to him by Dr. E. M. Brown. He saw her a month ago. He sent her to the hospital and had repeated examinations of her urine made. She secreted more urine now than normally, but there were no casts to be found in it. The case was one of interstitial nephritis, with double floating kidney. This case was interesting because the right floating kidney had been anchored before, but it did not relieve the pain. Decapsulation of the kidney and anchoring it by the capsule caused relief. The patient was healthier now than she had been for many years.

He mentioned the case of a man upon whom he operated for parenchymatous nephritis in August, 1902. The improvement in this case since operation had been very satisfactory. He had over 50 per cent. of albumen in the urine, which could not be reduced by changing climate and by medication and nursing; but double decapsulation reduced it to one-half of 1 per cent. What the remote result would be, he did not know.

Referring to the mortality, he said it was not fair to say that when a surgeon operated on a case of Bright's disease and decapsulated the kidney, if the patient lived for a month and then died, death was due to the operation. It was unfair to say that the mortality from decapsulation of the kidney was 100 per cent., 50 per cent., or even 15 per cent., because one should reckon from the operation *per se*. If a man should die afterwards from Bright's disease, he did not die from the operation. It should be simply stated that the operation did not cure him. The mortality to-day from renal decapsulation was in the neighborhood of 6 per cent. *per se*. As to how the improvement took place it was not known.

As to the formation of a new fibrous capsule, the speaker pointed out that we had two kinds of fibrous tissue produced by repair, one of which went on to cicatrization, with an increase in quantity, and the other behaved quite the reverse; as the patient became older the fibrous scar became less and less, until eventually it were hardly recognized. It is not yet proved whether the new fibrous capsule increases in bulk or not.

He was of the opinion that an anastomosis took place between the outside of the kidney and the newly-formed capsule. We had evidence of fibrous adhesions in other parts of the body becoming vascular, such as within the abdominal cavity and thorax. He had had one case with which he could demonstrate that. He had operated twice. The second time he opened the kidney and removed a section of the adherent new cortex of the kidney, and this was quite vascular. To prove this point would require a great deal of experimentation and observation.

The marked primary benefit he thought was due to the great determination of blood to the part, instituting a new order of things in chronic cases, and the relief of tension in acute ones. He believed, also, that puncturing or opening these kidneys, when they were considerably diseased, would prevent anuria. He had observed in the literature that one or two cases died from anuria.

If such a kidney were partly opened, the urine would escape on to the dressing, and it would prevent death from that cause. Relief of tension did not pertain so much to the chronic as it did to the acute cases.

Dr. Emil Ries said he was in a position to furnish information along the line of experimentation referred to by Dr. Ferguson, inasmuch as he (Ferguson) had mentioned the experiments of Albarran and his school as being unsatisfactory to the surgeon because they were performed on dogs, which did not have nephritis. He mentioned the case of a man, forty-four years of age, who had had hæmaturia. Patient had been treated for five weeks by medical men, and with the cystoscope it was determined that the blood came from the left kidney exclusively.

Remembering the excellent results obtained in cases of hæmaturia by numerous surgeons, first of all by Reginald Harrison and Israel, of Berlin, operation was advised. It was performed on the 8th of August, 1901. On the 11th the urine was clear, and remained so. The patient made a smooth recovery. In August of the same year patient had hæmaturia again (slight) for two months, and when admitted to the hospital it was considerable. Patient was pale, weak, and unable to work. Cystoscope again showed blood escaping from the left ureter and clear urine escaping from the right ureter, so that the presence of the right kidney was known. He advised patient to have the left kidney removed entirely, which was acceded to, and the organ was removed. The newly-formed capsule around the kidney was about as thick as one's little finger, and very firmly attached all around, so that it would have been difficult to remove the kidney with the capsule; but it was easy to detach the capsule from the kidney itself and remove the kidney. From the kidney removed over 600 sections were made. He had stained and examined every one of these sections, and among the 600 sections there was but one single anastomosis, and this anastomosis was near a strip of connective tissue which followed the path made by him in the first operation with his finger, which he inserted into the pelvis of the kidney. Even this was not a direct anastomosis of kidney tissue, but was a vessel in the scar tissue. In the rest of the sections examined there was not a single, solitary anastomosis. The 600 sections were taken from various parts if the kidney, and this experiment, if one wished to call it such, on the human being

proved conclusively that the theory of the *modus operandi* of this operation, to wit, that it was due to anastomoses forming, was incorrect. He wished to say, however, that the fact that the theory of the treatment was incorrect did not prove that the treatment was incorrect, or that the treatment was unsuccessful. It was not clearly known how mercury cured syphilis; nor how quinine cured malaria. Nevertheless, these are two generally used and successful methods of treatment. That the theory of the formation of anastomoses after renal decapsulation was wrong was not for the first time demonstrated on the human being in this case. A specimen of the same kind was demonstrated at the New Orleans meeting of the American Medical Association, and a report published in the Journal of the Association. In that case, too, no anastomoses were found.

The speaker had operated on five cases. Two did not live more than seven months. Both were advanced cases; in both there were findings in the fundus, hæmorrhages in the vitreous and retina. Two cases were decapsulated for hæmaturia; one in 1899, which was successful. The patient was alive and perfectly well to-day. He was over sixty years of age.

The second case was the one whose kidney tissue he had shown. He had operated on one woman with a floating kidney, with traces of albumen in the urine from time to time. There were occasionally hyaline casts. As he had to operate for floating kidney, he decapsulated the organ to a greater extent than he usually did in these cases, using the capsule for suspending the kidney. This woman was well. She was operated on a year and nine months ago. He saw her about six weeks ago, at which time she was in good health. There was no albumen in the urine at that time. But that did not prove very much, as the albumen had not been present constantly before the operation, either.

He was sceptical as to the results of this operation. Taking it altogether, including his two cases of hæmaturia, one of which was relieved for seven months, it confirmed what had been known for years. Operation did not improve the prognosis in those cases in which there was disturbance in the fundus. In cases of floating kidney, with the presence of albumen in the urine, improvement seemed to follow operation with decapsulation to a greater extent than without it; but as a treatment for chronic interstitial nephritis, he would never advise the operation. In the cases he had

operated upon he had not advised the operation either, except in hæmaturia cases. In the cases in which there were findings in the fundus, he would now advise against operation. His patients had heard of such operations, and had consulted him in regard to whether anything could be expected from it, and he told the patients that it was a matter of experiment If the patient wanted that experiment tried, he was willing to undertake it. With such an understanding he was willing to operate. He did not believe at the time he operated on these cases, nor did he believe to-day, that any definite promise could be held out.

Dr. Arthur Dean Bevan said that if it were not for the fact that Dr. Ferguson claimed to be the originator of renal decapsulation, he should call it the gynæcological treatment of Bright's disease. He had read Edebohl's first paper long before he heard of Ferguson's claim. Edebohl's operation was in line with the work of the gynæcologist who, in the ordinary cases which came to him complaining of trouble in the pelvis, backache, etc., employed as a routine treatment curettement of the uterus, sewing up of the lacerated cervix, and then sewing up the lacerated perineum. Finding, however, that many of the patients did not get well from this treatment he added to these measures fixation of the uterus as a routine. Even then many of the patients did not fully recover. He then added, as a routine, removal of the appendix at the time fixation of the uterus was undertaken, so that the house that Jack built read something like this: Curettement of the uterus; repair of the lacerated cervix; repair of the lacerated perineum; fixation of the uterus, and removal of the appendix. Finding that more of his patients recovered after this last procedure than before, but still there were some who were not benefited, he then added as a routine fixation of the right kidney. All of these operations were done at the same sitting, and all of the patients got well with the exception of those who had Bright's disease, and these he cured by fixation of the kidney and stripping of the capsule.

The speaker did not think renal decapsulation could be said to be the surgical treatment of Bright's disease, because, as a matter of fact, the great majority of surgeons throughout the United States and of the world had never accepted the operation as being a logical procedure. He ventured to say that nine-tenths of the surgeons who were members of the American Surgical

Association had not accepted renal decapsulation as a logical operative procedure. He did not think, therefore, it was strictly fair to call surgeons to account because this treatment was a failure. He thought credit should be given to Drs. Edebohls, Ferguson, and others for working out the problem. However, he thought the time had come when the profession could safely say that stripping off the capsule as a treatment for Bright's disease was a complete and perfect failure, and should receive the stamp of disapproval of scientific men. Out of this work had come some good, because it emphasized the importance of a class of cases in which another line of treatment was of value, namely, in cases of anuria, cases of essential kidney hæmaturia, in chronic pyelitis, with some nephritis, draining the kidney by a rapid nephrotomy was of distinct value. It had effected a great many cures, and would accomplish more. There were certain cases which came under the head of essential kidney hæmorrhage, and cases of pyelitis, with some nephritic involvement, which were difficult to differentiate sometimes by the most expert internist and diagnostician from Bright's disease, in which drainage of the pelvis of the kidney was of distinct value. But stripping off the capsule for the cure of Bright's disease was of very little, if any, value, and it now only remained for the profession to convince Ferguson, Edebohls, and others of this fact.

REVIEWS OF BOOKS.

DISEASES OF THE ANUS, RECTUM, AND PELVIC COLON. By JAMES P. TUTTLE, A.M., M.D., Professor of Rectal Surgery in the New York Polyclinic Medical School. New York: D. Appleton & Co., 1903.

This work appears to be one of the most complete, exhaustive, and thorough presented for the aid and instruction of the rectal specialist.

The chapters on Embryology, Anatomy, Physiology, and Malformations are full and accurate; that on Examination and Diagnosis being replete with valuable suggestions.

The author's handling of the subjects of Proctitis, and Catarrhal Diseases of the Sigmoid and Colon, leaves little to be desired.

The chapter on Tuberculosis of Rectum and Colon seems to the writer the most complete to be found in any modern work of the kind. Allingham, Kelsey, and Mathews give the subject but scant mention. The same is true of Gant in his recent work.

In Fissure in Ano the author describes a method of treatment, by repeated applications of pure ichthyol following insufflation of orthoform, by which means he claims a large percentage of cures in uncomplicated cases. This method seems worthy of fuller trial.

In operative procedure he indicates three methods,—dilatation, incision, and excision; and he seems, in the main, to favor incision, because, as claimed, it is more certain to cure, and obviates the necessity of a general anæsthetic. In this he agrees with Kelsey. The writer would dissent from this conclusion, agreeing most decidedly with Mathews in favoring dilatation, because the operation is less formidable; the relief, in nearly all cases, very prompt; the healing speedy, and the patient seldom laid up more

than one day, which is a great consideration. If the sentinel pile is removed, and overhanging edges paired if they exist, failure seldom results. The matter of general anæsthesia may be a point against divulsion. The writer has met this by using in over 800 cases nitrous oxide, which has answered the purpose admirably, and which the patients take with but slight inconvenience.

On the other hand, incision, unless deep enough to divide the sphincter, often fails, Dupuytren, Curling, and Copeland to the contrary notwithstanding, and when thus deep, makes a wound difficult to keep aseptic, which heals slowly, and in most cases means detention from avocation for some time.

The author's treatment of the subjects of Perianal and Perirectal Abscesses and Fistula is very full and explicit. The delineations of technique, methods of operation, and subsequent treatment, are admirable; and the indications pointed out in favor of excision with immediate suturing, in selected cases of fistula, worthy of fullest consideration.

In the matter of treatment of hæmorrhoids, this work may almost be said to mark a new departure, in that the author, differing from Allingham, Mathews, Gant, and from the present attitude of Kelsey, gives his unqualified endorsement to the usefulness of the injection method for the treatment of uncomplicated cases of internal hæmorrhoids.

His dissent from the almost universal chorus of condemnation by the standard authors is marked by a careful discrimination between the two systems in vogue, *i.e.*, the one which injects strong solutions in large quantities, thus causing sloughing of the tumors, and the one which uses small quantities of weak solutions, producing mild inflammation, induration, and final atrophy of the pile, without ulceration or sloughing.

The former he emphatically, and justly, condemns; the latter he endorses. Yet this first method is the one generally indicated and described by the authorities as the injection method, and its evil results pointed out.

For instance, Gant, in his recent work, gives as an illustrative case a patient who would not submit to an operation, whom he treated thus. Four tumors were injected at once with a moderately strong carbolic solution, ten minims to each tumor. On the tenth day, two tumors remaining were well treated in the same manner. Result, great pain, inflammation, sloughing, and abscess.

A practitioner experienced in this method would expect nothing else. The error is in the excess of fluid injected, overfilling the tumors, and extending the inflammation to the surrounding cellular tissue, and in treating too many tumors at once.

The experience of the writer, in a large number of cases treated by the milder method, leads him to almost adopt the identical conclusions of Professor Tuttle.

This method is not to be heralded as a universal substitute for the more radical and effective operations of ligature, clamp, and cautery; but there are multitudes of cases, when wisely selected, in which it will give very satisfactory cures, with a minimum of inconvenience, and no detention from ordinary duties.

The attitude of the profession must change in this regard, and this work will mark a step in the right direction.

The author's criticism of the modification of Whitehead's operation, introduced by Pratt, of Chicago, seems fully justified by several cases which have come under observation, where the results were very unsatisfactory.

The criticism of the Allingham and Vanburen method of cauterizing the mass in prolapse of the rectum with nitric acid or actual cautery is noted with satisfaction, as also the recommendation of the removal of sections of the membrane by clamp and cautery, as giving better guarantee of success.

The chapters on Malignant Neoplasms and Excision of the Rectum are replete with valuable information; and the large number of cases gathered and tabulated very instructive. The facts point to, and seem to bear out, the conclusions of the author, that early excision of the rectum, in judiciously selected cases,

not only offers a hope of prolonged life, but in a small per cent. of these unfortunate cases does give promise of permanent cure.

To counterbalance this, however, is the ominous death-rate of about 20 per cent., which the best aseptic technique has not been able to materially reduce. But when we consider that the lives thus shortened were doomed without surgical interference, the balance still seems to be in favor of the author's conclusion, when action is tempered with wise conservatism.

The author's treatment of colostomy, his careful differentiation of methods, and the conditions requiring the temporary or permanent operations are admirable.

It would seem that the limitations he suggests as to the usefulness of Colostomy in malignant cases of the rectum are justified; and that the attitude of certain surgeons, who seem to be ready to perform Colostomy on nearly all cases where excision is not admissible, in no sense commends itself to the conservative mind.

J. RUSSELL TABER.

GYNÆCOLOGY. A Text-Book for Students and a Guide for Practitioners. By WILLIAM R. PRYOR, M.D., Professor of Gynæcology, New York Polyclinic Medical School, etc. Octavo, 373 pp., 163 illustrations. New York: D. Appleton & Co.

The author of this work has given us a concise treatise upon those subjects which are strictly gynæcological, and which are commonly met with in private practice. Few rare diseases are described or illustrated, and no space is sacrificed to bibliography, minute anatomy or microscopy which are of little interest to the general reader. The reviewer can but congratulate Dr. Pryor on his selections and upon the general arrangement of this readable book.

Dr. Pryor's large experience as a teacher, his power to enthuse his auditors, and his positiveness, carry conviction, and

make the book of particular value as a guide to the general practitioner, who will find many excellent and explicit suggestions in the various chapters.

The work is divided into two parts. In the first, those diseases peculiar to women are clearly and concisely described, and the text elucidated with illustrations of more than ordinary merit. The second part of the book is devoted to a description of the various gynæcological operations, and a consideration of the indications and the contraindications for the same. The details of technique in both local and operative treatment of the various pelvic disorders are specially dwelt upon.

The chapters on pelvic inflammations are noteworthy, gonococcic and septic infections have received much attention, and the general subject of peritonitis is dealt with in such a thorough and practical manner that both student and surgeon will find it interesting and suggestive.

The sections on diseases of the urethra and bladder are replete with practical suggestions as to diagnosis and treatment, and merit commendation. The surgery of the perineum and cervix are well described, and the operations on these structures made clear by numerous, well-executed illustrations. One can hardly see reason for the author's strong advocacy of silver wire in plastic work, when chromic, tendon, and silkworm gut will give the desired results.

The chapters on ovarian and uterine neoplasms and cancer are interesting; these subjects are thoroughly, though not exhaustively, considered; the pathology of the latter disease is well illustrated, and the indications and limitations for operative intervention are definite.

The author's ideas on drainage after abdominal operation, and his general rules for its employment or avoidance, are based on sound logic, and will be read with profit.

Dr. Pryor we find at his best in his description of vaginal hysterectomy with hemisection of the uterus for pelvic suppura-

tion; this original chapter contains much that will be helpful to every gynæcological surgeon. The pages on the preparation of the patient for major operations and her post-operative management are of special value to the occasional operator, who is in need of explicit directions as to the proper care of his case.

There can be little doubt that the author favors vaginal operations when intrapelvic conditions make the vaginal route possible; however, he differentiates with skill the conditions to which it is applicable, and discusses the advantages of the abdominal operation without bias.

The work as a whole is interesting, original, scientific, and will be found to be a most practical aid to the student as well as to the finished surgeon.

JOHN O. POLAK.

DISEASES OF THE EAR. A Text-Book for Practitioners and Students of Medicine. By EDWARD BRADFORD DENCH, PH.B., M.D., Professor of Otology in the University and Bellevue Hospital Medical College. Third Edition, Revised. New York: D. Appleton & Co.

This treatise has already gained for itself a place of honor among the many books that have recently been appearing in this special field of work. The issue of a new and revised edition (third) of it speaks well for its character. The constituency for such a work is growing, but the work must have intrinsic worth to hold the constituency. This we concede it has.

The author adopts a style all his own: we are not often impressed with its like. It has a certain dignity of cadence, an *ex cathedra* quality of utterance, that reminds one of the lecturer proceeding with measured sentence and repelling querulous interruption.

This is impressive and takes with the general reader, who likes what is authoritative and seldom cares to question on his own initiative. Such a work does good where a fair and honest

quantum of responsibility is felt in such an attitude as we believe is here manifest. The revisions and additions are evidence of this sense. But in accordance with the style above noted is the ever-present sense of remoteness both in the original and in the revision. The author does not enter largely into discussion or detail. His treatment is curt and summary, but measurably complete.

HEBER NELSON HOOPLE.

INFECTIOUS DISEASES: Their Etiology, Diagnosis, and Treatment. By G. H. ROGER, Professor Extraordinary in the Faculty of Medicine of Paris, etc. Translated by M. S. GABRIEL, M.D., New York. Octavo, 864 pages. Philadelphia and New York: Lea Brothers & Co., 1903.

The time is ripe for the making of this book. Some one was needed to condense and systematize up to date our knowledge about Infectious Diseases. This the author has done in his own way. His qualifications were adequate. Being a master in the biological laboratory, and having exceptional opportunities as a hospital clinician, he combined in himself the indispensable prerequisites for this task. The task was prodigious,—so much literature to be read, so much to be done in the laboratory, so much to be seen at the bedside, and withal so much of the scientific habit of mind to properly marshal the vast amount of material into a homogeneous volume. The author has measurably succeeded. He has written well. He has made his book interesting and useful. With enthusiasm and eloquence he has made a scientific book pleasing. He has practically given us a treatise on medicine from a new view-point. He asserts things: he is nothing, if not positive. These are needed and valuable qualities in a good book. Besides, in the main, he succeeds in his aim and gets everything into one volume. We qualify his success, because of certain defects which we shall point out. But, first, we commend especially the chapter on Suppuration, valuable alike to the surgeon and the physician. The author is discriminating in his

chapter on Septicæmia and Pyæmia. Some of the author's statements are delightful in their very simplicity. In the chapter on Fever he states fever is "essentially characterized by an exaggeration of the chemical processes occurring in the organism," and "the fever of infections is a reaction of the organism against microbic toxins." Though the author has clear vision and logical acumen, we fear he is not always on his guard. At least we cannot leap with him to the conclusion that "all nervous affections (save family and hereditary disease) are caused by some infection or intoxication," because, as he says, inoculations with more or less virulent germs "in animals have produced a series of nervous affections and notably myelitis." We find him claiming, in a case of Landry's paralysis, where death occurred in a paroxysm of dyspnœa after paralysis of the feet and where the histological examination of the lumbar enlargement of the cord revealed altered nerve elements in the anterior horns without microbic foci (though the blood furnished pure cultures of the pneumococcus), that therefore the ascending paralysis was "due to pneumococcic infection." As a rule, the logic is more steady and reliable.

The short chapter on Mechanism of Immunity and Predisposition is one of the best. "The agglutinating reaction is specific. It is exercised only upon the element against which the animal reacts." "The modification of the fluids explains all acquired immunity." Statements like these are charming: they are easily accepted because so firmly stated, saving the reader from need of rebellious thought. The author is fully cognizant of the complexity of the problems, deals with them intelligently, and presents the most plausible case the facts afford.

Congenital Infections and Heredity and the Therapeutics of Infectious Diseases are both well-written and interesting sections and share our commendations. But in much of the rest of the book, and to some extent in these chapters, the author writes *too much*. A working knowledge is desirable; exhaustive analysis is not practicable in narrow limits. Therefore it is an error to attempt it, causing the style at times to become prolix and verbose

where for the most part it is delightfully terse and vigorous. The result is we have a big book on our hands, where one half the size would have answered better. In a word, the laboratory is too much in evidence *here*. In fact, it would be a great desideratum to have all the author's knowledge that is available in kernels of truth and wisdom gathered into small space so as to stand out boldly and impressively; for the book is rich in good meat if we could but easily get at it to eat.

We can lay no serious charge at the door of the translator, though he has strangely retained the French word "*recidive*" in the text. The publishers' part also has been well done. But we have a comment to make on this book in common with others emanating from European sources. In the first place, it contains a stingy index. Of all books that needed a liberal index, even a cross-index, this one most. In the second place, though we have credited the author with wide reading, generously acknowledged in his text, yet, like so many of his continental confrères, he almost completely ignores work and literature of England and America. Not once is there mention even of *yellow fever;* and, though many names are included in references to the work of Laveran, Patrick Manson and Ronald Ross are omitted. The title of this book is on the face of it a claim to comprehensiveness. All Americans will note with regret the failure to cite American researches in yellow fever and the name of our lamented Reed in its heroic relation to the study of that dire infection.

HEBER NELSON HOOPLE.

SOCIAL DISEASES AND MARRIAGE. By PRINCE A. MORROW, A.M., M.D., Emeritus Professor of Genito-Urinary Diseases in the University and Bellevue Hospital Medical College of New York. Octavo, 390 pp. New York and Philadelphia: Lea Brothers & Co., 1904.

It is the object of this work to set forth the dangers introduced by venereal diseases into marriage, and to indicate the most

effective means to prevent these dangers or to limit and circumscribe their spread. In pursuance of his plan, Dr. Morrow has divided his book into three parts, the first of which deals with Gonorrhœa and Marriage, the second with Syphilis and Marriage, the third with matters pertaining to Social Prophylaxis. The large part which gonorrhœa in recent decades has come to be recognized as playing is suggested by the fact that the section of this book devoted to the consideration of this part of the subject is the largest of the three. There is nothing sensational nor hysterical in the author's methods. His points are clearly made, and his statements of fact are in full accord with present knowledge. It is a book worth reading upon a subject that ought to be plainly and fully treated. Any intelligent adult would be benefited by its perusal, and it is not likely that its circulation will be confined to physicians.

LEWIS S. PILCHER.

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